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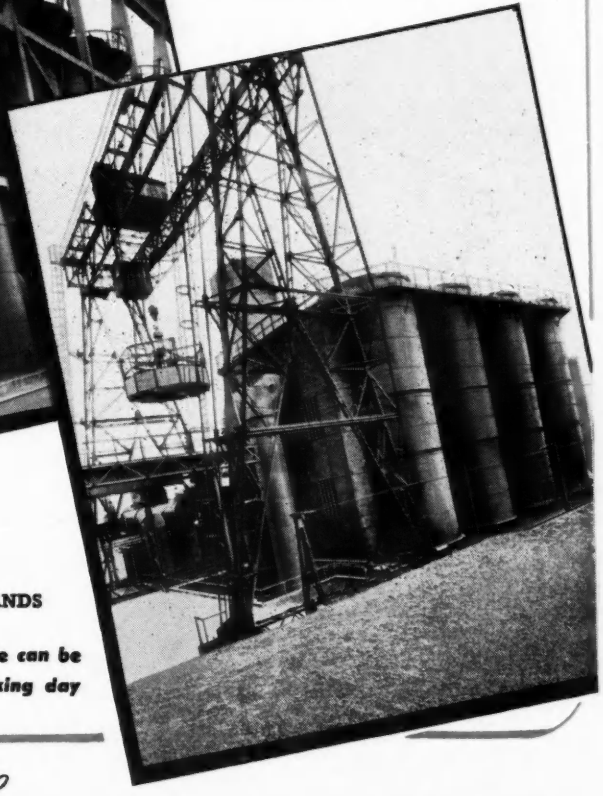

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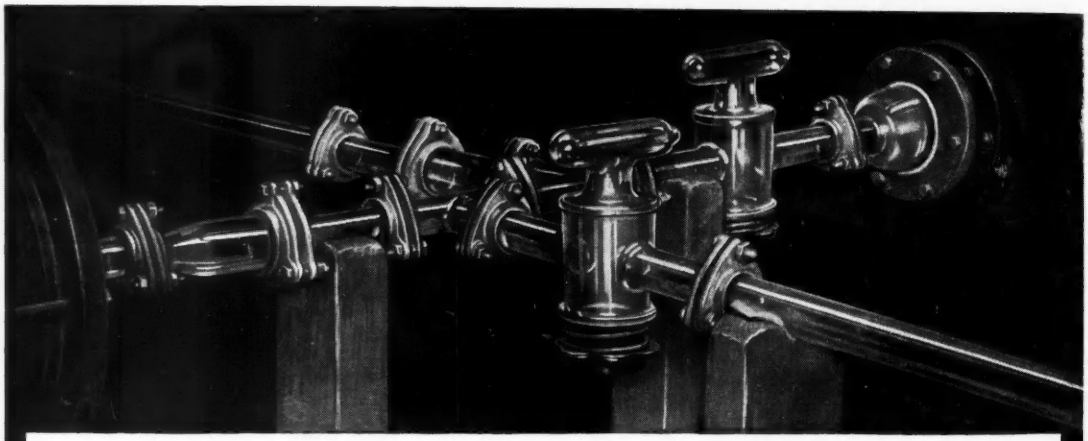

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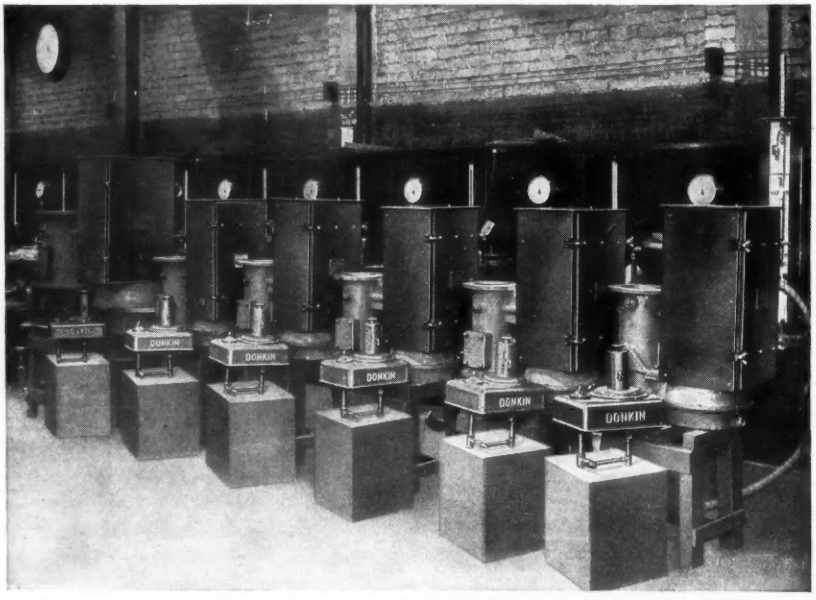

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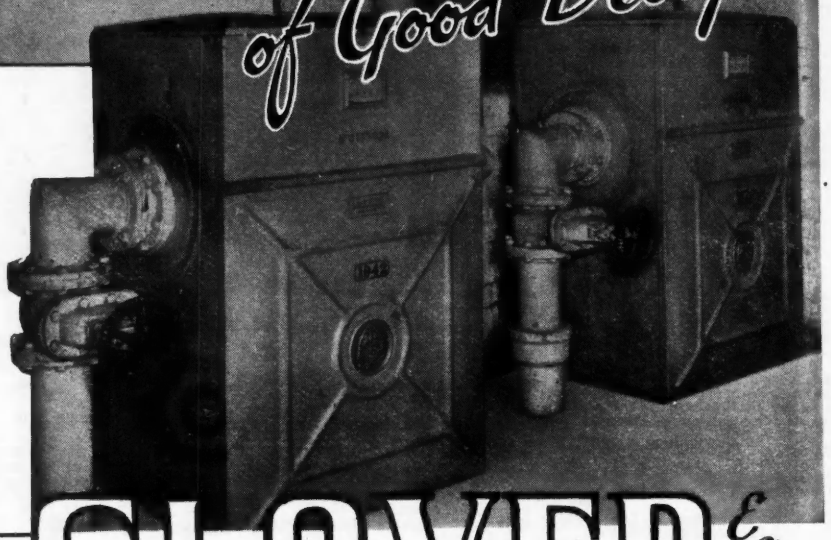

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GAS JOURNAL, NOV. 27, 1946

VOL. 248 98th YEAR No. 4358

THE SIZING OF SOLID FUEL

THE multiplicity of sizes which the colliery industry has deemed necessary in the past placed a severe strain upon the coal merchant. We are credibly informed that in 1938 no less than 340 different sizes of coal were marketed. Some of these sizes arose because consumers got the impression that they should ask for a sizing different from that with which they were commonly supplied in order to suit a particular appliance. Some collieries found it profitable to market their own particular sizes of coal and to endeavour to convince their customers that there was some magic in those particular sizes. Much the same state of affairs previously existed in coke marketing, but thanks to the efforts of the London and Counties Coke Association and later to the more extended efforts of the national bodies this position has been rectified in the Gas Industry.

The colliery industry began to put its house in order before nationalization became a live issue. It had come to the conclusion that two advances were necessary. The first step was to call like things by like names and to sell them at like prices; that was *classification*. The next stage was to determine whether any of those things which did not fall into established groups were really necessary, and if so to discard them; that was *standardization*. The coal marketing schemes were an attempt to introduce the principle of classification into coal marketing. Consumers did not always agree with the classification proposed and in many respects they were certainly too rigid. Consumers objected to being forced into classifications decided not so much by their needs as by the class of coal which they had purchased in the past. From many points of view, therefore, the classification system left much to be desired, and most consumers hope that when the present shortage of coal enables it to be done, the coal marketing system established before the war will be modified considerably.

An attempt has now been made to standardize the size grading of British coals. A comprehensive committee was set up representing colliery owners, coal merchants, coal exporters, combustion appliance manufacturers, the D.S.I.R., the Ministry of Fuel and Power, and various research associations. This committee has now reported. The report was published as long ago as last July, but was formally presented to industry at the recent Ministry of Fuel Conference. It divides all coals into seven sizes, each of which is characterized by what is known as the "typical screen size." These are: large cobbles, 6 × 3 in.; cobbles, 4 × 2 in.; trebles, 3 × 2 in.; doubles, 2 × 1 in.; singles, 1 × ½ in; peas, ½ × ¼ in.; and grains, ¼ × ⅛ in. Each of these sizes has a permitted range of screen apertures which gives the upper size of round hole and the lower limit of round hole. A new principle has been introduced in that upper limits are placed on the proportion of under-size which is permitted. The successful use of small coal depends to a large extent on the content of fines and it is for this reason that an exact method has been recommended for stating the fines content of each size. Among other factors, the committee has borne in mind the great importance of consistency in the fines content of smalls for the efficient operation of coal-consuming plant. The optimum content of fines depends on the use to which the coal is put and is inter-related with properties other than size; for example, in coking smalls, a high fines content may be desirable.

In commenting on this system it must be borne in mind that it is as yet no more than a report of recommendations that must be approved by the National Coal Board. The sizes will intimately concern combustion plant. The coal merchant is at the moment in a very difficult position. Once upon a time—it seems to-day almost like a fairy tale—he could ascertain his consumers' requirements and go out into the coal fields to buy coal which was suitable for those requirements. To-day he receives coals which to him are unknown, from collieries, and even from coalfields, that he has never dealt with before; he has no facilities for testing the coals; and he must often send them out on the same day that he receives them. There is a great deal of hit-and-miss in that procedure and as a result consumers very often get coals which are unsuitable for their purpose. It would be interesting and revealing if an estimate could be made of the aggregate amount of coal wasted each year through attempts to burn unsuitable coals in selective appliances. No doubt the coal industry in due course will be able to set up a system of orderly marketing and this difficulty will disappear. For the time being, however, there appears to be almost complete chaos in coal distribution. Particular sizes of coal are sent to consumers by reason of the "priority" they have been allotted and not by reason of the type of appliance in which the fuel is to be used. The National Coal Board has indeed a Herculean task in bringing order out of this chaos and it is a task made even more difficult by reason of the extreme shortage of coal of all sizes.

COAL CLEANING

THERE is little doubt that mechanization underground will bring about considerable changes in coal preparation. In theory, the miner underground exercises selection in what he loads into the tub and is supposed to discard most of the dirt. Only 5% of the total output of the mines is now mined by truly mechanical means. When mechanized loading is brought into general use, the shale and the coal will be loaded together. It is quite clear that when that happens there will be no alternative to installing coal cleaning plant at every colliery. That will be a great advantage providing that a proper coal cleaning policy is adopted by the National Coal Board. Some plants and processes will require ultra-clean coal containing, let us say, less than 3% of ash. The carbonization industry hopes and prays for adequate

supplies of such coal. Coal used for combustion, on the other hand, should generally contain from 8 to 10% of ash. The cleaning of coal must be planned in accordance with the demand, not only for coals of various sizes but for coals of various ash contents. It must not be forgotten either that mechanized mining will produce somewhat smaller coal than the present method. There is no purpose in producing very large lumps of coal as there is no industry, and very few domestic firegrates, which burn these large lumps efficiently. Consequently, the general sale of graded coal will be to everyone's advantage. There will, however, be larger quantities of slack in the form of peas and grains for which a use must be found.

The point of view of the Gas Industry was put to the conference by Mr. T. F. E. Rhead, who welcomed the proposed reduction in the number of sized grades and the simplification in the present-day terminology. The Gas Industry does not necessarily require closely graded coal and, as Mr. Rhead pointed out, even in continuous vertical retorts the Industry in and around the London area is regularly carbonizing 1½ to 2 million tons of highly swelling crushed run-of-mine coal. Up-to-date gas-works generally possess coal breaking plant and where this is available there is no reason for the use of closely graded coals for horizontals. The Fuel Research Station in Technical Paper 26 showed that smalls below ¾-in. produce a gas some 20-30 B.Th.U. per cu.ft. higher in calorific value than graded coals, without any reduction in thermal yield. On the other hand, the carbonization of dry smalls containing a high percentage of fines below ⅛-in. brings trouble from dust being carried into the ascension pipes and tar mains, and with poorly coking coals leads to dangerous flares, when discharging. The moisture content of slack coal is rather important because if too wet there is trouble in the chutes, and retort temperatures tend to be reduced.

Since the incorporation of both top and bottom offtakes in present day designs, intermittent verticals will deal with any size of coals which suits horizontals. Mr. Rhead explained in his contribution how variation in size affects the output of a plant.

Modern designs of continuous verticals will carbonize crushed run-of-mine coal with swelling indexes up to 9, but Mr. Rhead also pointed out that this type of plant is very responsive to coal size. Improved porosity of the charge facilitates quicker carbonization, due to internal heating by uprising gases. The porous charge also allows better steam contact, which leads to better steam cracking and a more reactive coke. There is a rough relationship between the desirable size of coal and the Swelling Index, and generally more smalls can be incorporated with the lower swelling index coals without impairing the improvement of output; moreover, a suitable proportion of smalls helps to improve the calorific value.

The size range of gas coals should not be too considerable as segregation may result which adversely affects the operation of the retorts. Continuous verticals are generally designed with a margin sufficient to allow flexibility in the choice and size of coal. Mr. Rhead considers that the greatest flexibility as regards coal purchase, and the greatest flexibility in working lie with a combination of intermittent plant and continuous verticals. The smalls below 1 in. can be screened for use on intermittent plant and the larger coal can be used on continuous verticals. This system, in effect, means that the gas undertaking buys run-of-mine coal and prepares it for its own use.

CONSTANCY OF COAL SUPPLY

THESE considerations suggest that the Gas Industry is not so much concerned about the new size grading as are other industries based on combustion. Nevertheless, the general effect must be good particularly in that variations in size are reduced considerably, and with the general adoption of standard sizes the need for sizing at the gas-works should disappear. Mr. Rhead pointed out that constancy of supply as regards size and type of coal is essential if high efficiencies are to be obtained, and this may well be one of the chief effects of the new system, if and when it is adopted. He summed up for the conference what he regarded as the developments that are likely within the Gas Industry in this direction during the next 10 years. He believes that more attention will be paid to conditions which will ensure constancy in size and type of coals to the retorts; that more attention will be paid to the size and type of coal needed to give a coke of improved combustibility, &c., as a contribution to the solid smokeless fuel market; that greater endeavours will be made to use coals not at present employed for gas manufacture, especially those possessing lower coking qualities; that there will be more extensive installation of storage bunkers and mixing machinery to allow flexibility in choice and purchase of coal; and that more attention will be paid to the control of extraneous moisture in coal.

All these developments we beleive to be sound, but some of them may be achieved by the new size grading specification of the coal industry so that, as has been stated previously, it will be unnecessary for the Gas Industry to undertake its own coal preparation. It might be reasonably expected that the collieries, being the vendors, would do everything in their power to make their product suitable for the needs of the purchasers. Whether the attempts previously made in the Gas Industry to use the poorer coking coals—generally lower in gas yield—to produce more combustible coke will now come to fruition, and whether an improved coke of higher combustibility can be manufactured by the method of coal blending in the future, depend to a great extent on the policy to be pursued by the National Coal Board. We were impressed by the obvious desire of the three Directors of the Board who spoke at the conference to meet the wishes of coal consumers and, in our present view, the Board may well sweep away much that was out of date and objectionable in the marketing of coal. We give the new Board credit for being aware of the need for encouraging British industry by supplying to users the types of coal they need at a reasonable price—so far as lies within their power. We would even venture to prophesy that the objective of many gas engineers to produce highly combustible coke by blending coking with non-coking coals will be made possible by an enlightened National Coal Board.

IMPORTANCE OF COKE GRADING

THE practice and precept of coke sizing was stated by Mr. Boon, who pointed to the confusion of sizes that formerly ruled. This confusion was dissipated in the Southern half of the country when four standard sizes were defined for gas coke in 1933, and has been clarified for the whole country by the general acceptance of the size grading proposed by the Committee on Coke Quality set up by the Institution of Gas Engineers in 1938. About half the gas coke production in the country is now sized to these standards, and the remainder will be brought into conformity in due course as and when the necessary alterations can be made to the screening plants. While there are many properties of coke that govern its behaviour in practice, Mr. Boon believes that there is no single consideration so important as that of size. The worse the quality of the coke, the more essential becomes its sizing.

Here again sizing is not the only important aspect of the marketing of solid fuel to which attention should be paid. The coal industry regards its sizing policy as the start only, a fact which was emphasized by Sir Charles Ellis, the scientific member of the National Coal Board. Similarly, Mr. Boon has noted that the adoption of uniform sizing of coke enabled the appliance manufacturers to make advances on their side of the industry. From the coke consumers' standpoint, the improvement and development of appliances in which coke could be efficiently used, having progressed in parallel with

the production of sized cokes, has materially altered the whole aspect of coke sales, particularly in the domestic field. It is no exaggeration to say that since the adoption of the standard sizes of coke and the availability of suitable and efficient appliances, the efficiency of domestic utilization has been doubled in little more than a decade. This achievement must not go unrecorded, for it is a contribution to the efficient use of fuel of which the Gas Industry may well be proud and of which the Ministry should be made fully aware. The vociferous claims for economy in the use of fuel made for district heating are seen in their proper perspective only when viewed against the background of the efficiency of coke and gas used under modern conditions. While there are reports made by committees, and *ex parte* statements of all kinds, in favour of district heating, we have not yet heard of an unbiassed enquiry into the relative fuel cost of providing equal quantities of heat by this method and by other methods which are already available. Meanwhile, the 1st Report of the District Heating Committee of the Institution of Gas Engineers which showed that a combination of coke and gas leads to the lowest fuel consumption, remains uncontroverted.

There are, of course, problems of sizing yet to be faced. Mr. Boon has rightly emphasized the breeze problem that faces the carbonizing industries. At least 12% of the total coke produced for sale is degraded to breeze in the process of coke treatment for the production of the marketable sizes. We hold also that there is a problem to be faced in the production of more combustible coke by known or new methods, which do not involve the adoption of uneconomic processes that adversely affect the gas-making efficiency of the plant. Those problems will not be forgotten in the future; they will no doubt receive serious consideration from the Gas Research Board.

STANDARD GRADES

CLEARLY, it would be desirable for all producers of coke to operate on standard grades. We do not necessarily mean by this that oven coke should be sold in exactly the same sizes as gas coke. The combustibility of coke in practice depends partly on its constitution and partly upon its size. What sizes will ultimately be found to suit oven coke remains to be seen, but the British Coke Research Association is undertaking extensive and detailed investigation of the whole problem of cutting and screening as applied to the specification of coke sizes and the determination of the most suitable sizes for specific duties. It would appear that the Coke Oven Industry is separately, but equally, moving with the Gas Industry towards the adoption of five standard sizes. There is close co-ordination between the two sides of the carbonization industry on this matter, a co-ordination which is very necessary in many directions.

Our impression after hearing the debate at the conference on the sizing of solid fuel is that there is little doubt that the National Coal Board will accept the sizing committee's recommendations, and that the adoption of a small number of closely delimited sizes is likely to have a considerable effect on the efficient use of fuel in the future. Appliance manufacturers will be able to design their appliances to suit a fuel which is known; the Gas Industry will receive coals of sizes that will suit the plant available. One small doubt occurs to us. It looms on the horizon no smaller than a man's hand, but it may well wreck the whole scheme. It is this: Will the sized coals be available? There is no reason why this problem should not be faced and solved. To-day, the sized coals are not available. In the future, with greater mechanization in mining, there will be more smalls. All that is necessary is that the National Coal Board shall inform itself and its consumers what relative quantities of the various sizes and types of coal will be available, and settle firm and long-term prices for the various grades. When that is done appliance manufacturers and others can design their plant to suit the coals that are available.

Fuel Economy in the Royal Household

In support of the appeal made by the Government for the utmost economy in the use of all forms of fuel during the winter months notices are being posted throughout the royal establishments, including Buckingham Palace. His Majesty the King is taking a personal interest in the matter. The notices, which have been issued in the name of Sir Piers Legh, Master of the Household, point out that the royal establishments should regard it as a duty to provide an example in reducing the use of power and light to a minimum. Sir Piers Legh therefore makes a special appeal to all in the royal household to use fuel as sparingly as possible and to avoid any unnecessary use of fires or lights.

Output of Gas Appliances

Reporting on the progress that has been made in the production of housing fitments, Mr. J. Wilmot, Minister of Supply, told a Press conference in London last week that production was steadily increasing, and in several instances the pre-war level of production had been reached or surpassed. With one or two exceptions sufficient fitments had been procured to meet the entire temporary housing programme. Comparing the present monthly production figures with those of 1938, the Minister said that 206,000 gas water heaters were produced per month this year as against 113,000 per month in 1938. Quoting more recent output figures, he said that 34,821 gas cookers were produced in October this year, compared with 30,019 in the previous month. Mr. Wilmot said that he had arranged to publish future production figures of a representative selection of items in the Central Statistical Office's Digest of Statistics and the Ministry of Health's Housing Return. He paid tribute to managements and workers throughout the country, without whose co-operation it would have been impossible to meet commitments, and said that the standardization of components was another factor responsible for increased production. There were still some bottlenecks to be overcome. In widening these bottlenecks foundry workers comprised the greatest need. Twenty thousand were needed immediately, and the Government were doing everything in their power to attract workers by improving working conditions.

Personal

Mr. NORMAN H. WIMHURST, son of Mr. F. L. Wimhurst, who recently retired from the post of General Manager of the Newcastle-under-Lyme Gas Department, has been appointed Representative for Geo. Orme & Co., Atlas Meter Works, Oldham.

* * *

Alderman C. W. GASCOIGNE, deputy Lord Mayor of Sheffield, who has been Secretary of the local Gas Workers branch of the National Union of General and Municipal Workers since its foundation 35 years ago, has resigned his secretaryship. Alderman Gascoigne was recently promoted to the position of Inspector under the Sheffield and District Gas Company.

* * *

Mr. REGINALD S. HINDER has been appointed Press Officer of the British Gas Council in succession to Miss Joan Monypenny, who has resigned. Mr. Hinder, well known in Fleet Street for many years, left the United Press Associations of America in 1941 to take a commission in the Royal Air Force and joined the Directorate of Public Relations at the Air Ministry. On demobilization, he went to P.A.-Reuter Features and now leaves Hulton Press to take up his new appointment.

* * *

The name of Mr. H. J. WORKMAN, formerly of the cooker department and latterly of the meter department, has been added to the Newport (Mon.) Gas Company's roll of honour for 50 years of faithful and loyal service, and at an informal lunch he was presented by Mr. R. Wilson Bartlett, Deputy Chairman, with the Company's long service certificate and national savings certificates. The surviving employees whose names appear on the roll of honour were among the guests. The opportunity was taken to congratulate Mr. Wilson Bartlett on his appointment as High Sheriff.

Obituary

The death occurred on Nov. 22 of Mr. A. G. SIMS, Director of Robert Cort & Son, Ltd., Reading, who had for many years been widely known and esteemed in the Gas Industry.

News in Brief

Miss Marguerite K. Gompertz visited the recently-formed Hawick branch of the Women's Gas Council on Nov. 20, giving a gas cookery demonstration.

The Ideal Home Exhibition will be held again next spring. It will be open at Olympia for 12 hours a day from Mar. 4 to Mar. 25, and a feature of the exhibition will be that goods similar to those displayed will be available for purchase. Nothing will be " for export only."

Additional Storage is urgently needed by the Bourne (Lincs.) Gas Department, and Mr. J. Rose, Engineer and Manager, has recommended the erection of a new holder of 200,000 cu.ft. capacity. The Council has forwarded his report to the Ministry of Fuel and Power with an application for permission to proceed with the work.

Research in the Laboratories of I.C.I. Metals Division has resulted in the development of "Kumium," a copper-chromium alloy with the unique characteristic of retaining its tensile strength, hardness, and conductivity at temperatures of the order of 400° C. Thus an important new property, essential for certain uses, has been added to the durability, low specific resistance, and good thermal conductivity which have established copper and copper alloys for such wide applications in engineering. A booklet has been issued describing the properties and uses of the new alloy.

The Ministry of Fuel and Power has intimated that the British Iron and Steel Federation is prepared to assist in deliveries of steel in connexion with the retort extension work at the works of the Dumfermline Gas Department, and the Ministry has advised the Woodall Duckham Company to that effect. Bailie Gellatly, Convener of the Gas Committee, said they hoped that the new retorts would be put into commission by January. He intimated that a reduction in gas pressure would be necessary during the winter months.

The Power Gas Corporation, Ltd., has issued a new brochure describing the most modern type of automatically operated mechanical carburetted water gas plant installed in gas-works. It includes several interesting photographs of the plant at the Lower Sydenham works of the South Suburban Gas Company, a full description of which was given by Mr. S. C. Herbert, Maintenance Engineer, in his recent Paper on " The Application of the Lockheed Principle to the Automatic Operation of a Carburetted Water Gas Plant " to the Southern Association of Gas Engineers and Managers (Eastern District).

The Turner Pressure Testing Pump, a new simple, reliable pump for high pressure testing of valves, cocks, cylinders, tanks, &c., with water or oil, is described in a leaflet issued by the Turner Manufacturing Co., Ltd., Wulfruna Works, Wolverhampton. The pump is installed simply by making a connexion to the factory air line, and operates by transforming the compressed air into high pressure liquid, the degree of pressure being dependent upon the air pressure available and the capacity of the pump. The pump operates continuously until the maximum pressure is reached, when it stops automatically, holding the pressure indefinitely without any loss or movement. Immediately the hydraulic pressure is lowered the pump automatically restarts. An adjustable air reducing valve allows infinite variation of air pressure between zero and maximum.

Newcastle-upon-Tyne and Gateshead Gas Company recently issued, in the form of an artistic Christmas card, an invitation to a series of Christmas fare demonstrations which commenced on Monday and continue until Dec. 5. Similar demonstrations were always a popular feature in pre-war days, and in these new days old favourites appear in new ways. Attached to the syllabus was a tear-off reply card on which consumers were asked to indicate which of the demonstrations they wish to attend, so that tickets of admission, which were, of course, free of charge, might be issued. Also enclosed with the invitation was a " recipe note " card in the form of a blank menu for use in jotting down ideas during the demonstrations. The whole of the admission tickets for the series of 12 demonstrations were taken up two days after the announcement.

Dr. A. McCance, Director of Colvilles, Ltd., delivering his Presidential Address to the Scottish Engineering Students' Association at Glasgow emphasized the necessity at the present time for steels which would perform satisfactorily at the increased operating temperatures met with in the present day high efficiency power generating plants. He gave an outline of creep testing methods and described a new development whereby results, which formerly took months to acquire, could now be obtained in about a week. He also described the procedure followed in creating new alloys specifically to meet the needs of a given set of operating conditions. Referring to the much discussed topic of gas turbines, Dr. McCance stated that metallurgical investigations into high temperature resisting alloys had greatly increased the life of these turbines, but that the stage had not yet been reached where their life was sufficient for their economical use in general industrial plant.

A Paper on " Gas Firing " was delivered by Mr. Alex. Bujnowski (Glasgow Department) to the Scottish Section of the Institute of Fuel on Nov. 22, dealing with industrial gas distribution.

Dividends were Declared at the annual meeting of the Louth Gaslight Company at the rate of 12½% on Ordinary shares, 9½% on New Ordinary shares, and 5% on the " A " and " B " Improvement stocks.

Bedworth Urban District Council, in whose area the City of Coventry Gas Department is responsible for gas supply, has decided to install in 268 permanent houses gas cookers which will be provided as part of the house fitment.

To Meet the Increased Demand for gas at Stirling, without reducing the pressure, the Town Council has leased part of the Goosecroft Road car park to the Stirling Gas Light Company, who indicated that they had the necessary machinery for extension, and needed only extra ground.

Eighteen Prizes, comprising eight firsts, three seconds and seven thirds, were gained by Mr. H. G. Park, Valveman at the Stanmore Station of the Gas Light and Coke Company, at the Royal Horticultural Society's Chrysanthemum Show. One of his seconds was in the R.H.S. Centenary Prize competition for all comers.

The Board of Trade has published a revised Raw Materials Guide, which sets out all the raw materials controlled by them and by the Ministry of Supply, giving brief details of the types of control in force and the addresses to which any inquiries should be addressed. It is obtainable, price 1s. 6d., through any bookseller or newsagent, or direct from H.M. Stationery Office.

Over 70,000 German Civil Patent Specifications, covering wartime developments in German industry and research, have been brought to Britain from the Berlin Patent Office, and are open to inspection at the Patent Office Library, 25, Southampton Buildings, Chancery Lane, London, W.C.2. The specifications are in German. Name and subject indexes are available up to the end of 1942 and quarterly name indexes up to September, 1943. Subject searching after 1942, however, may be facilitated by reference to copies of the weekly classification list, *Patentblatt*. Photographic copies of any specification and drawing may be obtained at the rate of 6d. per page.

Diary

Nov. 28.—Institute of Fuel (North Western Section): " Domestic Fuel Efficiency " Discussion with National Smoke Abatement Society and Merseyside Civic Society, Radiant House, Liverpool, 2.30 p.m.

Nov. 30.—London and Southern District Junior Gas Association: Visit to Maidstone Gas Company.

Nov. 30.—Western Junior Gas Association: Inspection of Exeter Gas-works, 2.30 p.m. " Water Treatment at Exeter Gas-works," H. G. Stapley, Gas Showrooms, 3.45 p.m.

Dec. 7.—Scottish Junior Gas Association: Joint Meeting of Eastern and Western Districts, Edinburgh. " Carbonization," C. A. Poulson.

Dec. 10.—Midland Junior Gas Association : " Gas and the Water Heating Field," W. J. Parsons.

Dec. 10.—British Gas Council: Central Board, 2.30 p.m. Gas Industry House.

Dec. 11.—London and Southern District Junior Gas Association: " Foundations and Reinforced Concrete Work on a Gas-works," F. Ward. Gas Industry House, 2.30 p.m.

Dec. 11.—National Federation of Gas Coke Associations: General Committee, 10 a.m. Gas Industry House.

Dec. 12.—Solid Smokeless Fuels Federation: Executive Committee, 11.30 a.m., Dorchester Hotel, Park Lane; Technical Committee, 2.30 p.m., Gas Industry House.

Dec. 13.—National Federation of Gas Coke Associations: National Technical Committee, 10.30 a.m., Gas Industry House.

Dec. 13.—Industrial Gas Development Committee, 10 a.m. Gas Industry House.

Dec. 13.—North of England Gas Managers' Association (Auxiliary Section): Forty-seventh Half-Yearly Meeting, Gas Showrooms, West Hartlepool, 2.15 p.m. Papers by D. B. Laws (Sunderland) and S. G. Irvin (Newcastle-upon-Tyne).

Dec. 18.—Gas Research Board: Finance Committee, 11.15 a.m.; Membership Committee, 12 noon; Council, 2 p.m. Gas Industry House.

Shannon Diamond Jubilee

Nearly 1,000 guests, among whom were Colonel C. M. Croft, Managing Director of the Wandsworth Gas Company, and Mrs. Croft, attended a party given by The Shannon, Ltd., at Wimbledon Town Hall on Nov. 13 to celebrate the Company's Diamond Jubilee. Following a formal reception, long service presentations were made to members of the staff by Mr. E. F. Shannon, Managing Director and son of the Founder, and a new superannuation scheme was announced.

Silver cups were presented to Mr. E. W. Cane, Chief Buyer, and Mr. F. W. Wain, Branch Manager, in recognition of 50 years' service, and silver cups for 25 years' service were handed to Mr. S. G. Gulson, Chief Clerk, Mr. E. W. Brading, Ledger Department, and Mr. A. E. Woodard, Area Manager. Nineteen of the older employees present, several of whom had already received their long service presentations, had an aggregate of 682 years' service. The Shannon, Ltd., was founded on Nov. 12, 1886, by Captain F. W. Shannon.

Mr. E. W. Cane, who has been with the Shannon, Ltd., for 50 of its 60 years' activities, with his long service cup. Immediately behind are Mr. E. F. Shannon, Managing Director, and Mrs. Shannon, who presented the cups and prizes.

A bouquet was presented to Mrs. E. F. Shannon and another was sent to Mrs. F. W. Shannon, wife of the Founder, who, at 87, was unable to be present on account of indifferent health.

Manufacturers of all kinds of office furniture and equipment, and more especially the Shannograph Flat-top Filing System, the Shannoblic Filing System (steel-hung on steel), and several Shannon Visible Record Systems, the Company built its present New Malden factory in 1926. The factory was then, and still is, a model of modern design, good lighting, and up-to-date working conditions. The workers are not "mass producers," for all the products are peculiarly individualistic and call for the old-time type of British craftsman rather than the one-motion type of worker encouraged by present day conditions. Incidentally the Company introduced steel furniture into this country round about 1905.

"Shannon Corner" has become a landmark, for even London Transport realized that the Company had given the locality a name long before they and the Post Office put it on their maps. The Company will shortly introduce one or two efficiency systems which it is claimed will revolutionize modern industry.

Dancing, including some old-fashioned typically British romps which recalled the days in which the Company was founded, refreshments, and an excellent cabaret show occupied the rest of an enjoyable and memorable evening.

Workington Enterprise

The Autumn Meeting of the Cumberland and Westmorland Gas Managers' Association was held at Workington on Nov. 14, under the Presidency of Mr. J. George Pope, Engineer and Manager, Workington Gas Department. After formal business a visit was paid to the newly inaugurated works of G. Corner & Co., Ltd., Gas Cooker Manufacturers, at Marshside, Workington. Under the guidance of Mr. T. Bennet, Works Manager; Mr. E. Hunt, Sales Manager; Mr. McCulloch, Sales Representative; and Mr. Lester, Chief Draughtsman, the party was conducted over the works and followed each process from the preparation of the steel sheets through to the final assembly of the all-steel enamelled cooker at present in production.

The **President** in thanking the hosts for their hospitality remarked that this was the first time that their Association had visited a works where gas cookers were made and the fact that this had been possible in Cumberland marked it as a red letter day. They welcomed this enterprise in Workington as providing variable employment from the heavy basic industries of coal and steel and as a sign of confidence in the future of the Gas Industry; also as potential consumers of gas through the Workington Gas Department. It was already apparent that the employment of local labour for making gas cookers was making the district pro-gas.

Mr. **J. G. Aitken** (Carlisle) seconding, said he could assure the Company that the members had enjoyed an interesting afternoon, especially as this was the first time many of them had seen a gas cooker made and certainly none of them a cooker of such revolutionary design. They had all been impressed by the great care taken to ensure a high quality product. It was evident from the design that high cost of renewals would be avoided.

Mr. **Bennet** and Mr. **Hurst**, in reply, said they much appreciated the kind things that had been said about their cooker. Gas engineers could rest assured that there would be no change in the basic design. Any alterations that might be necessary would be of a minor character.

Coal Vesting Date

The Minister of Fuel and Power, Mr. Emanuel Shinwell, has announced that the primary vesting date for the transference of the coal mines to national ownership will be Jan. 1, 1947. In making the announcement Mr. Shinwell said the National Coal Board had been working extremely hard in preparing for the actual taking over of the mines at the earliest possible moment. The administrative problems involved in an immense and un-precedented operation of this kind were, of course, formidable. Suitable office accommodation had been difficult to secure. A great variety of staff had to be engaged and first class personnel were never easy to find, especially for a new form of organization. It would be some time before finality was reached in the case of many assets for which options had to be exercised. The Board had also to make arrangements to continue conciliation machinery and wage agreements in the industry and to provide for adequate financial arrangements and controls, and so forth. In many ways the Board would have to make temporary and provisional arrangements until their organization was fully staffed. Composite undertakings would present special difficulties.

In spite of the problems with which the Board was faced, there was, he was sure, general recognition in the industry, which the Board shared, that the mines should be vested in the Board at the earliest possible date. The Board could count on the fullest co-operation of the National Union of Mineworkers and of all those concerned with the industry in overcoming the inevitable difficulties of the transitional period.

After careful consideration and after consultation with the Board, he had decided that the transference of the mines to national ownership should take place on Jan. 1, and he accordingly proposed to make the necessary Order under the Act to fix that as the Primary Vesting Date.

Exhibition at Paisley

Paisley has the distinction of being the first town in Scotland to house the Home Planning Exhibition organized by the British Gas Council. The Exhibition, which is being held in the North Minor Town Hall, was opened by Provost Rev. J. Chambers.

Baillie George Walker, Convenor of the Gas Committee, presided at the opening ceremony and extended a warm welcome to the large gathering on behalf of the Gas Committee. He thanked neighbouring undertakings for their valuable help in staffing the Exhibition and hoped it would be well patronised by the public.

Before declaring the exhibition open Provost Chambers said they had in Paisley a very successful undertaking and it had attracted some of the best brains in the country. He had the good fortune to know four gas managers at Paisley—Mr. Hislop, Mr. Nisbet, Mr. Smith, and now Mr. Dow—and he had counted Paisley fortunate to have these excellent men in control.

Mr. David Fulton as Chairman of the Scottish Executive Committee of the British Gas Council thanked Provost Chambers for opening the Exhibition and said that it was through Paisley's enterprize and initiative that the town was chosen for the first showing in Scotland of the Home Planning Exhibition and it was a compliment to Paisley Corporation and to Mr. Dow their Gas Engineer. Mr. Fulton asked Provost Chambers and Baillie Walker to accept a fountain pen set as a momento of the occasion.

Close on 6,000 people visited the Exhibition during the first two days.

Gas Operated Refrigerators are going into thousands of new houses now being erected. Electrolux, Ltd., in their periodical Builders' Bulletin record that for the six war year stheir Luton factory was engaged on war work, but it is now back to peacetime production. Their silent refrigerators, which can operate on gas or electricity, are the only refrigerators displayed in the kitchen exhibits at the "Britain Can Make It" exhibition.

Institution of Gas Engineers

7th Report of the Chairmen's Technical Committee: 1945-46*

THE membership of the Chairmen's Technical Committee is:—

Col. C. M. Croft, D.L., J.P., M.Inst.C.E., M.I.Mech.E. (*Chairman*); E. V. Evans, O.B.E., D.Sc., F.R.I.C.; C. F. Botley, M.Inst.C.E.; Lt.-Col. F. J. Bywater, M.C., M.Inst.C.E.; J. E. Davis, F.R.I.C.; H. J. Escreet, B.Sc.(Eng.), M.Inst.C.E.; A. Forshaw, M.Sc.; J. T. Haynes, M.Inst.C.E.; T. F. E. Rhead, M.Sc., F.R.I.C.; R. J. Rogers; F. C. Smith; Col. H. C. Smith, C.B.E., D.L., J.P., M.Inst.C.E.; S. E. Whitehead, J.P., B.Sc., M.Inst.C.E., M.I.Mech.E.

The President, the two Vice-Presidents and the Honorary Secretary of the Institution (*ex officio*).

The Chairmen's Technical Committee continues its work of co-ordinating the work of the Technical Committees of the Institution, and through its inclusion in its membership of the Chairmen of the Technical Committees of The Gas Research Board, a closer degree of collaboration between the Institution and the Board is maintained.

The return to peace has not been accompanied by the easement in regard to conditions of travel or of accommodation which might perhaps have been anticipated, and difficulties associated with them are still acute. The work of the Technical Committees has nevertheless continued throughout the year, and the service of the members of the Committees in these difficult times is much appreciated both by the Institution and Government Departments concerned.

A Coal Conservation Committee has been appointed by the Council to deal with the efficiency of production and utilization of town gas in relation to fuel economy. A brief account of the work of this Committee is included in this Report.

The Institution maintains its contacts with the Committees of the Ministry of Works and with the Codes of Practice Committee, and is represented on these Committees as well as on the Gas Lighting Committees and their sub-Committees of the British Standards Institution. During the year a number of Codes of Practice and British Standards have been prepared in which the Gas Industry is interested and in the preparation of which it has collaborated. Collaboration with the Parliamentary and Scientific Committee has been continued.

The Institution Gas Research Fellowship is at present held by Mr. G. W. Culshaw, B.Sc., and the Third Arthur Duckham Research Fellowship is held by Dr. J. K. Kilham. An account of their work appears at the end of this report.

The Fourth Arthur Duckham Research Fellowship, which takes the form of a travelling scholarship to investigate the Gas Industry in America, has been awarded to Dr. J. E. Garside, who is now in the United States of America.

Coal Conservation Committee

The membership of the *ad hoc* Committee on Coal Conservation is:—

E. V. Evans, O.B.E., D.Sc., F.R.I.C. (*Chairman*); C. H. Chester, O.B.E.; J. E. Davis, F.R.I.C.; H. R. Hems; R. J. Rogers; F. C. Smith; S. E. Whitehead, J.P., B.Sc., M.Inst.C.E., M.I.Mech.E.

The Coal Conservation Committee was initiated by the Council of the Institution in November, 1945, to consider and report upon the efficiency, from the point of view of coal conservation, of the production and utilization of town gas and other products of gas manufacture.

The Committee has enlisted the assistance of independent experts, whose opinions upon the problems connected with the utilization of fuel generally are accepted as authoritative, and with this assistance is preparing a report.

Codes of Practice Sub-Committee

The membership of the Codes of Practice Sub-Committee and its Drafting Panels is:

Codes of Practice Sub-Committee:—

Lt.-Col. F. J. Bywater, M.C., M.Inst.C.E. (*Chairman*); G. C. Holliday, B.A.; R. D. Keillor; R. J. Rogers; the Chairman of each Drafting Panel; F. C. Button, F.R.I.B.A., F.S.I. (representing the Royal Institute of British Architests); Director of Fuel Research (representing the Department of Scientific and Industrial Research); P. Good, C.B.E. (representing the British Standards Institution); B. Svenson (representing the Building Industries National Council).

Drafting Panels:—

Panel A (Connexions to Mains, Gas Service Pipes, Control Valves or Cocks).—H. J. Escreet, B.Sc.(Eng), M.Inst.C.E. (*Chairman*); S. T. S. Musgrove; H. Singleton, M.I.Mech.E.; N. S. Smith.

Panel B (Meters and Connexions, Consumers' Installation Pipes).—W. K. Tate, M.A., Assoc.M.Inst.C.E. (*Chairman*); C. R. Austen; H. M. Browne, M.C.; A. J. Garward.

Panel C (Gas Lighting).—F. C. Smith (*Chairman*); J. B. Carne, B.Sc.; W. J. G. Davey, B.Sc.; W. Hodkinson; E. Howard; J. M. A. Mitchell.

Panel D (Hot Water Supply by Gas).—D. Chandler (*Chairman*); L. Friedman; R. N. Le Fevre, A.M.I.Mech.E.; H. P. Lupton, B.Sc., A.R.I.C.; J. M. A. Mitchell; T. F. C. Potterton; A. St. Leger.

Panel E (Space Heating, Cooking, Refrigeration by Gas).—J. E. Davis, F.R.I.C. (*Chairman*); L. W. Andrew, B.A., B.Sc.; H. Davies, B.Sc.; D. M. Holloway, B.Sc.; A. C. Long; J. M. A. Mitchell; W. L. S. Spinks.

Panel F (Flues for Gas Appliances).—L. W. Andrew, B.A., B.Sc. (*Chairman*); W. A. Bishop; H. M. Browne, M.C.; T. Smith; F. H. Swain.

Panel G (Gas Heated Appliances for Laundering and Ancillary Domestic Purposes).—R. N. Le Fevre, A.M.I.Mech.E. (*Chairman*); W. F. Andrews; E. E. Blandon; G. W. Brooks, B.Sc.; D. Chandler; A. St. Leger; H. P. Lupton, B.Sc.; J. M. A. Mitchell.

Liaison Officer:—H. G. Ellis.

The death of Mr. B. J. Bell (Cardiff), a member of Drafting Panel B, is reported with regret.

The Sub-Committee and its Drafting Panels have continued their work during the year, and the Codes of Practice dealing with the distribution and utilization of town gas are reaching an advanced stage.

The Codes dealing with the under-mentioned subjects have been circulated for comment by the British Standards Institution:—

- Installation of Gas Service Pipes.
- Gas Metering and Consumers' Control.
- Gas Installation Pipes.
- Gas Lighting (Single-family Dwellings).
- Space Heating by means of Independent Gas Appliances (Single-family Dwellings).
- Gas Cooking Installations (Single-family Dwellings).
- Installation of Gas-operated Refrigerators.
- Hot Water Supply by Gas (Single-family Dwellings).
- Flues for Gas Appliances.
- Installation of Gas Heated Appliances for Laundering and Ancillary Domestic Purposes.

The Sub-Committee record its appreciation of the wide and general interest which the Codes have created. The comments submitted have been most helpful to the Sub-Committee and to the Drafting Panels in revising the draft Codes and in preparing the final Codes. It is hoped that these will be accepted and used both by the Gas Industry and by the public at large so that a higher standard efficiency in the utilization of gas will result.

The above-mentioned Codes have been revised by the respective Panels in the light of comments submitted, and the six first-mentioned have been approved by the Engineering Services Sectional Committee of the main Codes of Practice Committee. They are now awaiting the approval of the main Committee before being published as completed Codes. The three last-mentioned have been revised by the respective Drafting Panels and are ready for submission to the Engineering Services Section Committee.

Further Codes are in preparation dealing with:—

- Domestic Hot Water Supply by Gas for Buildings other than Single-family Dwellings and Schools.
- Domestic Hot Water Supply by Gas for Schools.
- Gas Cooking Installations for Schools and Meal Centres.
- Gas Lighting for Buildings other than Single-family Dwellings.
- Installation of Gas-fired Central Heating Boilers.
- Space Heating by Independent Gas Appliances in Buildings other than Single-family Dwellings.

Liaison with the officials of the Ministry of Works and with the Codes of Practice Committee has been maintained by the Liaison Officer of the Sub-Committee (Mr. H. G. Ellis, London), to whom the Sub-Committee expresses its gratitude.

Co-ordinating Committee of Gas Engineering Advisory Boards

The membership of the Co-ordinating Committee of Gas Engineering Advisory Boards is:—

S. E. Whitehead, J.P., B.Sc., M.Inst.C.E., M.I.Mech.E. (*Chairman*).

C. F. W. Rendle, O.B.E. (*Vice-Chairman*).

Members of the General Purposes Committee:—The President, the two Vice-Presidents, three Honorary Councillors, four senior Ordinary Members of Council and the Honorary Secretary of the Institution.

* Presented at the Autumn Research Meeting, Nov. 26.

Chairmen and Secretaries of Regional Boards:—(No. 1) J. R. Bradshaw, B.Sc.(Eng.); R. H. Duxbury. (No. 2) N. Hudson; G. A. Bentley. (No. 3) J. Mitchell; W. L. Bray. (No. 4) T. C. Battersby; J. Hunter Rioch. (No. 5) F. M. Birks, C.B.E., M.Inst.C.E., M.I.Mech.E.; C. W. Jennings. (No. 6) P. G. G. Moon, O.B.E., M.Inst.C.E.; J. T. Haynes, M.Inst.C.E. (No. 7) W. J. Baker, A.M.I.Mech.E.; J. T. Spencer. (No. 8) J. F. Rust; E. M. Edwards, A.M.I.Mech.E. (No. 9) C. F. W. Rendle, O.B.E.; F. H. Bate, B.Sc. (No. 10) F. G. Shaw; F. Johnston. (No. 11) James Jamieson; R. Sturrock. (No. 12) E. L. Nicholas; M. L. Pitt.

The Committee has to report the appointment of Mr. C. W. Jennings (London) as Secretary of the No. 5 Advisory Board, in the place of Mr. W. K. Tate, M.A., who resigned on his appointment as General Manager of the Portsmouth and Gosport Gas Company.

The Committee reports with pleasure the honour accorded to its Vice-Chairman (Mr. C. F. W. Rendle, Redditch), upon whom the Order of the British Empire has been conferred.

Meetings of the Co-ordinating Committee are held at regular intervals, at which the presence is invited of the Director of the Gas and Electricity Division of the Ministry of Fuel and Power (Mr. R. Kelf-Cohen) and of members of his staff. Discussions are held at these meetings on the work of the Boards, as set out in their reports, and on the increasing difficulties with which the Undertakings are faced. The coal situation is still very serious, and this, coupled with the shortage of skilled labour, particularly in regard to the repair and renewal of manufacturing and purifying plant, much of it already overworked and badly in need of overhaul, has created a situation of unprecedented difficulty for many Undertakings. The Committee gratefully acknowledges the efforts that have been made by the Director and his staff to alleviate as far as possible some of this difficulty. The reports of the Boards indicate the maintenance of a high degree of efficiency of carbonization and of fuel utilization in respect of which some credit is due to the officials of the Boards.

The Regional Boards were originally initiated to meet a situation arising out of the exigencies of war, and, since this situation is to some extent altered, the view has been expressed in some quarters that the function of the Boards has been filled and their useful work completed. In general, however, it is agreed that the Boards still continue to fulfil a most useful function in the efficient utilization of fuel, and accordingly they are continuing to operate. The willingness of gas undertakings throughout the country to collaborate is an important feature of the success of the work of the Boards and is greatly appreciated.

District Heating Committee

The membership of the District Heating Committee is:—

Mr. J. E. Davis, F.R.I.C.; G. C. Pearson, O.B.E., M.Inst.C.E.; N. S. Smith. The President, the two Vice-Presidents and Honorary Secretary of the Institution (*ex officio*).

Co-opted:—W. Hodkinson; C. H. Leach, M.A.; C. E. Sanderson, B.Sc.; W. L. S. Spinks.

The First Report of the District Heating Committee (Communication No. 286 of The Institution of Gas Engineers) was presented at the 11th Autumn Research Meeting of the Institution. The Committee has not met since the publication of the Report, but a number of enquiries have been dealt with by post. The Committee requests that data concerning any projected district schemes be forwarded for its information and consideration.

Gas Installations Committee

The membership of the Gas Installations Committee is:—

R. J. Rogers (*Chairman*); Mrs. G. Abbott; H. M. Browne, M.C.; R. D. Keillor; R. N. Le Fevre, A.M.I.Mech.E.; H. P. Lupton, B.Sc., A.R.I.C.; J. M. A. Mitchell; H. Singleton, M.I.Mech.E.; N. S. Smith.

Co-opted:—J. H. Markham, F.R.I.B.A.

The Committee has to report, with regret, the death of one of its members, Mr. B. J. Bell (Cardiff), who had been associated with the Committee since its inception.

It has not been necessary to convene the Gas Installations Committee during the year, but it has continued, through its Chairman and members, its collaboration with the Ministry of Works, the Ministry of Fuel and Power, and Gas Industry Committees concerned with the utilization of gas.

Gas Works Safety Rules Committee

The membership of the Gas Works Safety Rules Committee is:—

J. E. Davis, F.R.I.C.; G. le B. Diamond, M.I.Mech.E.; Thomas Hardie, M.Inst.C.E.; L. Hartley, M.I.Mech.E.; H. Hollings, D.Sc., F.R.I.C.; D. D. Melvin; A. G. Palmer, B.Sc.; G. C. Pearson, O.B.E., M.Inst.C.E.; T. F. E. Rhead, MSc., F.R.I.C.; C. S. Shapley, M.Inst.C.E.; Col. H. C. Smith, C.B.E., D.L., J.P., M.Inst.C.E.; E. G. Stewart; the President, the two Vice-Presidents and the Honorary Secretary of the Institution (*ex officio*).

Co-opted:—L. F. Stemp, B.A., LL.B.

The resignation of Mr. F. M. Birks, C.B.E. (London), from the Chairmanship and membership of the Committee is reported with regret, and the Committee desires to express its appreciation to Mr. Birks for his valuable services. A new Chairman of the Committee has not yet been appointed.

The Committee reports with pleasure the acceptance by Mr. A. G. Palmer, B.Sc. (Works Regulations Officer, The Gas Light and Coke Company), of its invitation to serve on the Committee Mr. Palmer's many contacts with the officials of the Department of H.M. Chief Inspector of Factories have been of great assistance to the Committee in the past and his membership of the Committee is welcomed.

Consideration has been given of a Report by officers of the National Physical Laboratory on Wind-tunnel experiments on Models of a Spirally-guided Gasholder, and to a digest prepared by Mr. S. M. Milbourne upon the results of those experiments, and has recommended the publication of both documents.

The Committee has given consideration to examples of electrolytic corrosion, which have been brought to its notice, and is proposing to appoint a Sub-Committee to deal with problems connected with electrolysis and other electrical matters.

A Report dealing with Roller Carriages on Gasholders has been presented to the Committee by Mr. F. M. Birks, C.B.E. (London), and will be presented at the 12th Autumn Research Meeting of the Institution.

A Preliminary Draft of Regulations as to Safety, Health and Welfare in connexion with Work of Engineering Construction which H.M. Chief Inspector of Factories proposes to introduce under Sections 46 and 60 of the Factories Act (1937), has been examined by the Committee, and a number of suggested amendments have been submitted to H.M. Chief Inspector in regard to Regulations particularly affecting Gas Undertakings.

The Committee has been privileged to study a report, accompanied by photographs, of war damage to four gasholders in Norway, which was submitted by Mr. John Irminger, M.Inst.Gas E., of Bergen.

The causes of minor explosions which have occurred in the purifiers of two Works and the meter-house of a third have been investigated by the Committee.

Joint Lighting Committee

The membership of the Joint Lighting Committee is:—

Institution Nominees:—F. C. Smith (*Chairman*); A. Maurice Bell; D. Chandler; W. J. G. Davey, B.Sc.; J. E. Davis, F.R.I.C.; J. Weatherall Foreman; W. Hodkinson; A. V. Horsfall; D. D. Melvin; A. R. McGibbon; F. W. Sansom, M.B.E.; D. M. Thompson; C. I. Winstone.

Society of British Gas Industries Nominees:—S. F. Baker; W. R. Edgar; Col. C. J. Falk; C. H. A. Kempton; R. J. Rogers; H. R. Stevenson; Philip H. Sugg; H. Talbot.

Affiliated District Gas Associations' Nominees:—James Dickson (North British); E. Howard (Midland); H. Maycock (Wales and Monmouthshire); J. M. A. Mitchell (North of England); H. W. Saville (Irish); H. Singleton, M.I.Mech.E. (Manchester); W. S. Stredwick, M.Inst.C.E. (Southern); George Wright (Eastern Counties).

Ex officio:—The President, the two Vice-Presidents and the Honorary Secretary of the Institution.

Co-opted:—L. T. Minchin, B.Sc.

The Committee has to report the resignation of Mr. E. S. Harris (London), on his relinquishing the post of Public Lighting Superintendent of The Gas Light and Coke Company, and the appointment of his successor, Mr. A. V. Horsfall (London), to serve in his place. Mr. L. T. Minchin, B.Sc. (London), has been appointed as a co-opted member of the Committee.

Upon the recommendation of the Joint Lighting Committee, the Council has under consideration the initiation of regional advisory lighting panels, composed of experts particularly versed in public-lighting matters to deal with lighting enquiries within their respective regions. The co-operation of the larger Undertakings throughout the country has been invited, and the Committee desires to record its appreciation of the ready response to the suggestion. It is felt that lighting problems, particularly those connected with public lighting, are very largely dependent upon local circumstances and that they are better dealt with on a regional basis.

The Committee took steps to ensure that the annual Conference of the Association of Public Lighting Engineers, held in London in September, 1946, should be well supported by the Gas Industry, and appointed an *ad hoc* Committee, under the chairmanship of Mr. C. I. Winstone (London), to deal with the matter. In collaboration with the British Gas Council a brochure was prepared for distribution at the Exhibition of Lighting Equipment, at which the manufacturers and the British Gas Council had stands displaying the latest gas-lighting apparatus and photographs of lighting installations by gas.

A Paper entitled "The Quality of Public Lighting Installations and the Modern Use of the Gas Service" was presented by Mr. P. Crawford Sugg, B.Sc.(Eng.), (London), which was accompanied by a film dealing with gas-lighting units and installations.

The Committee has approached the Commissioners of Customs and Excise in regard to exemption from purchase-tax of gas mantles, and hopes that sympathetic consideration will be given to the request when the purchase-tax payable on certain commodities is reviewed by the Commissioners.

The Committee has maintained its collaboration with appropriate Government Departments, the National Illumination Committee of Great Britain, the Illuminating Engineering Society, the Association of Public Lighting Engineers and the Lighting Committees of the British Standards Institution.

A British Standard Specification dealing with Gas-lighting Units and Fittings for Single-family Dwellings has been prepared for use in conjunction with Chapter VII (F) of the Functional Code of Building Requirements and with the Gas Industry Code of Practice dealing with Gas Lighting for Single-family Dwellings. In preparing this Specification, the Committee was privileged to have the advice and assistance of the Council of Industrial Design, for which assistance it records its gratitude. This Specification is at present in circulation for general comment.

Another British Standard Specification concerning the Classification of Light Distribution is also in circulation for comment. This is of particular interest in that calculations similar to those employed in the Specification for lighting may be applied to overhead heating sources, the results being expressed not in terms of illumination, but in B.Th.U. falling on unit area per hr. The method enables the space: height ratio for reasonable uniformity to be determined in a very convenient manner.

Liquor Effluents and Ammonia Committee

The membership of the Liquor Effluents and Ammonia Committee is:—

C. F. Botley, M.Inst.C.E. (*Chairman*); T. Lewis Bailey, Ph.D., F.R.I.C.; H. T. Calvert, M.B.E., D.Sc., Ph.D., F.R.I.C.; Prof. J. W. Cobb, C.B.E., D.Sc.; W. A. Damon, B.Sc., F.R.I.C.; E. V. Evans, O.B.E., D.Sc., F.R.I.C.; H. Hollings, D.Sc., F.R.I.C.; P. G. G. Moon, O.B.E., M.Inst.C.E.; A. Parker, C.B.E., D.Sc., F.R.I.C.; P. Parrish, F.R.I.C., E. W. Smith, C.B.E., D.Sc., B. A. Southgate, D.Sc., Ph.D.; the President, the two Vice-Presidents and the Honorary Secretary of the Institution (*ex officio*).

Co-opted:—L. F. Stemp, B.A., LL.B.

The Committee has met at regular intervals during the year and has, with the assistance of the research chemists at Leeds University, given advice to a number of Undertakings in connexion with the disposal of effluents. The matters which have been presented to the Committee include, *inter alia*, prob'ems relating to an alleged pollution of river water, a proposed agreement under the Drainage of Premises Act (1937), complaints of nuisance arising from the discharge of effluents into small streams, the refusal or hesitation of local authorities to accept effluent into their sewage systems, the storage of crude or waste liquor, and the disposal of liquor through sewers.

Dr. A. H. Eastwood (Research Chemist), in collaboration with his colleagues at the University of Leeds, has an interesting programme of research in hand, which includes investigations into the formation of thiocyanates in scrubbers, and the use of retort house liquor as a fertilizer.

The Committee's attention has been drawn to some interesting work by the staff of the Water Pollution Research Laboratory concerning chlorinated sewage effluents, in which it has been shown that certain effluents containing thiocyanate when chlorinated are highly toxic to fish. It would appear that this toxicity is mainly due to a compound formed by interaction of chlorine with small quantities of thiocyanate which may be derived initially from gas liquor admitted to the sewage. Since the admission of gas liquor to sewage is common practice, it would seem that the discharge to a river of chlorinated sewage effluents might endanger the life of fish, particularly if the dilution afforded by the river is small, although this contingency is remote.

The Eighth Report of the Liquor Effluents and Ammonia Committee is published as a separate Communication (No. 304) of The Institution of Gas Engineers. In it the work of the Committee during the past nine years is reviewed.

Meters Committee

The membership of the Meters Committee is:—

Institution Nominees:—

J. T. Haynes, M.Inst.C.E. (*Chairman*); C. R. Austen; H. E. Bennet, M.C.; H. W. Hodgson: R. D. Keillor; C. H. Smith; W. L. S. Spinks; W. K. Tate, M.A., Assoc.M.Inst.C.E.

Society of British Gas Industries Nominees:—

T. C. Braddock; Col. W. R. Glover, C.M.G., D.S.O., T.D., J.P.; Norman L. Smith.

Ex officio:—

The President, the two Vice-Presidents and the Honorary Secretary of the Institution; R. J. Rogers (Chairman, Gas Installations Committee).

The Committee has to report, with regret, the death of two of its members, Mr. L. F. McLeod, O.B.E. (London), and Mr. J. H. Wilson, M.B.E. (Coventry), both of whom had been members of the Committee since its reconstitution in 1942. Mr. C. H. Smith (London) has been appointed to serve on the Committee in the place of the late Mr. L. F. McLeod.

The Committee has continued its meetings during the year at which consideration has been given, *inter alia*, to the standardization of meter dimensions and to the provision of suitable alternative materials for use in the manufacture of meters. In connexion with the former, the Committee is giving consideration to a degree of uniformity in the dimensions of both domestic and industrial meters.

Through the courtesy of the Controller (Gas), Control Commission for Germany (Mr. H. D. Greenwood, M.Sc.), the Meters Committee has been able to study a Report on the Manufacture and Repair of Household Gas Meters in the Fuhlsbüttel workshops of the Hamburg Gas Works, and to examine a meter manufactured in the workshops and constructed of plastic materials.

The Meters Committee has been in consultation with the Ministry of Supply in regard to the supplies of East Indian sheepskins for meter leathers.

The Gas Research Board has continued its investigations, initiated at the request of the Meters Committee, into the provision of suitable alternatives for meter leathers, and, in this connexion, the Committee has examined some fabrics impregnated with plastic materials. The Rubber Research Association is also collaborating in this research. One of the difficulties associated with the enquiry is the development of appropriate accelerated performance tests which will give indication in a short time of the likely behaviour of the materials over a number of years of service. This research must be regarded as a long term investigation and there is no indication of the likelihood of finding a completely satisfactory leather substitute in the immediate future.

In situ testing of meters has been continued during the year and the further results obtained confirm the Committee's view of the desirability of the periodical testing of meters. It is hoped that as the present difficult position in regard to the supply of labour and materials gradually becomes easier, more Undertakings will consider the initiation of such testing.

Pipes Committee

The membership of the Pipes Committee is:—

H. J. Escreet, B.Sc.(Eng.), M.Inst.C.E. (*Chairman*); F. Boardman, M.I.Mech.E.; R. G. Marsh; S. T. S. Musgrove; F. White; the President, the two Vice-Presidents and the Honorary Secretary of the Institution (*ex officio*).

With the death of Mr. L. F. McLeod, O.B.E. (London), the Pipes Committee has also lost a valued member. His place has been taken by Mr. F. White (London).

As was reported in the Sixth Report of the Chairmen's Technical Committee, the Pipes Committee has been engaged in the preparation of a Specification for Gas Surface Boxes. This has now been submitted to the British Standards Institution, which has accepted it as a draft British Standard Specification and has circulated it as such for comment.

The Committee has continued to collaborate with Government Departments, the British Standards Institution, and other professional Institutions. In connexion with the latter, the work of the Sub-Committee on the Corrosion of Buried Metals of the Corrosion Committee of The Institution of Civil Engineers is being followed.

As was reported in the Sixth Report of the Chairmen's Technical Committee, a Joint Committee of The Institutions of Civil and Municipal and County Engineers, upon which The Institution of Gas Engineers is represented by the Chairman of the Pipes Committee. has been considering the preparation of a Report upon the Location of Underground Services. This Report was issued by the Joint Committee in July, 1946, and has been circulated to all local authorities.

The recommendations in the Report necessarily represent a compromise between the practices of the statutory authorities in various parts of the country and can, therefore, only be regarded as a general guide without mandatory powers. As to whether or not the recommendations are adopted in any particular locality must, of course, depend upon agreement between the utility undertakings concerned.

Institution Gas Research Fellowship Report

The *Institution Gas Research Fellowship Report:* 1945-46 (Communication No. 306), by G. W. Culshaw, B.Sc., F.R.I.C. (Research Fellow), and J. E. Garside, Ph.D. (Lecturer in Fuel Technology, University of Leeds), deals with further studies of aerated burner flames, with particular reference to the measurement of ignition, velocity, dead space and radius of curvature in propane—air media, and to some observations of polyhedral flames.

The hypothesis that the ignition velocity of any specific gas—air mixture is a physical constant was found to be true only if the surface area of the inner cone of the flame is actually measured and not estimated by one of the numerous methods of earlier workers.

The combustible mixtures used in previous investigations of Institution Gas Research Fellows were all of intermediate ignition velocity, but, in view of the importance of ignition velocity in burner design and of establishing a satisfactory method of determining ignition velocity, combustible-air mixtures of low ignition velocity have here been used, propane being the combustible gas chosen.

The relationship between dead space and the radius of curvature of the inner cone tip has afforded an interpretation of dead space as part of the thermal gradient in front of the flame to be made in accordance with the Mache theory. This interpretation has been endorsed by the present measurements of dead space and radius of curvature using propane—air mixtures.

During the measurements of ignition velocity it was observed that in mixtures containing a considerable excess of combustible gas above that required for chemical equivalence, the inner cone, when separated from the outer mantle, assumed an unusual polyhedral form, and some observations have been made on these flames.

Arthur Duckham Research Fellowship Report

The *Third Arthur Duckham Research Fellowship Report:* 1945-46 (Communication No. 307) by J. K. Kilham, B.Sc., Ph.D. (Research Fellow), deals with energy transfer from flame gases to solids, and describes preliminary investigations at the University of Leeds during his first nine months of tenure of the Fellowship.

The amount of heat radiated from a flame is comparatively low, rarely exceeding 15% of the total heat of combustion. In order to utilize the heat more efficiently a solid is usually introduced into the flame, and the energy transferred from the flame to the solid is used either as radiation from the solid, as in a gas fire, or by conduction to any material in contact with the solid. The mechanism whereby energy is transferred from the flame to the solid is by no means clearly understood, and the present work was undertaken in an attempt to elucidate this problem.

The possible mechanisms of energy transfer from flame gases to solids have been considered and reasons have been advanced for selecting the process of forced convection for preliminary investigation.

After a brief survey of the laws of heat transfer by forced convection and radiation, a method of determining the rate of energy transfer in a simplified case is described. Preliminary results, although as yet only qualitative, seem to be capable of correlation on a forced convection hypothesis.

The Distribution of Ash in British Coals and its Bearing on the Economics of Coal Cleaning

By E. S. GRUMELL and A. C. DUNNINGHAM

(A "GAS JOURNAL" Abstract)

At the Manchester Conference on the Preparation and Utilization of Coal, in February, 1945, attention was drawn to (a) the very considerable loss of heat units which can occur when coal is cleaned, and (b) the desirability of fuel problems being studied jointly by producers, appliance makers and consumers.

The extent to which the ash content of a coal can be reduced economically depends primarily on the distribution of ash, and the main object of this paper is to give a broad picture of this distribution in British coals, showing how ash content varies from coal to coal and from district to district, and to show why some coals are "easy" and others "difficult" to clean. The data submitted relate to industrial coals, generally less than 2 in. in size—*i.e.*, those which are usually cleaned.

It was shown at the Manchester Conference that cleaning may result in a loss of heat units, increasing rapidly as the ash content of the cleaned coal is reduced. A "difficult" coal containing 22.7% ash as received from the pit may lose 7% of the original heat units when cleaned down to 9% ash, but 21% (three times as much loss) when cleaned to 4% ash. On the other hand certain "easy" coals can be cleaned down to 4% ash for a loss of only 2.6% of the original heat units, but here again the loss would be 6% if cleaning were pushed to 3% ash.

Part I of the Paper deals with the distribution of ash and definitions.

It is shown that there is linear relation between ash content and specific gravity. Pure coal, middlings, clean coal, and dirt or refuse are defined in terms of specific gravity, "but it must be understood that the definitions are arbitrary and based on usage rather than on any exact scientific reasoning."

"Pure" coal is defined as material which floats at 1.35 sp. gr. and contains approximately 2.8% ash as a national average.

"Middlings" is material which floats between 1.35 and 1.60 and contains approximately 14.4% ash as a national average.

"Dirt" or "refuse" is that which sinks at 1.60 and contains about 60% to 70% ash.

"Clean" coal (or washed coal) is the mixture of pure coal and middlings floating at 1.60 and containing 4.4% ash, assuming 100% separation from dirt.

"Discard" is the material rejected from the washing to the tip.

Pure coal is further analyzed into fractions floating at 1.28, 1.28 to 1.30, and 1.30 to 1.35, with corresponding ash content ranging from 1% to 2.5%, 1.75 to 5.0, and 4.0 to 7.0, respectively. The average ash content of pure coal is of the order of 2.8%, but the range is from 1.0% to 6.5%, due to the differing distribution by weight of the fractions. Data show that 89% of the coals sampled would contain from 1½% to 4%, while 70% would give less than 3% ash. Similarly "middlings" range from 12% to 17% ash over district averages, while 77% of coals produce middlings ranging from 11% to 17% ash. "Clean" coals average 13.8% middlings by weight averaged over British coalfields. District averages range from 8% to 18%. "Dirt," sinking at 1.60, usually consists of shale, slate, stone, clay, ankerites, pyrites, and other minerals, each with its own sp. gr. ranging from 1.6 to about 2.7. The fraction 1.6 to 1.7 frequently contains carbonaceous shale and sometimes coal so heavily intergrown with the shale that it sinks at 1.60. Though this fraction is admittedly very high in ash content, probably 35% or 40%, the carbonaceous shale may have a C.V. of 8,000 or 9,000 B.Th.U./lb.

In Section 5 of Part I analyses are set out on a "refuse-free" basis or on a "clean coal" basis, which it is claimed gives a real comparison.

The average composition of British clean coal is:

Pure coal—86.2% by weight containing 2.8% ash.
Middlings—13.8% " " 14.4% "

Therefore the average ash content of clean coal is 4.4%, a figure agreeing closely with 4.6 given by Chapman and Mott. Diagrams and tables showing results of sampling reveal that only 24% of the coals examined will produce clean coal with 3% or less ash and 51.3% will produce clean coal with 4% or less. Extreme cases are an "easy" coal producing clean coal with 1.4% ash and a "difficult" one with 7.8%.

The figures given as based on laboratory cleaning. It is pointed out that in practice separation is not carried out with 100% completeness. Distribution of ash in clean coal by districts on the refuse-free basis varies from 3.1 in Nottinghamshire, 3.4 in Durham, 3.6 in Yorkshire to 6.1 in Ayrshire, 13 districts being mentioned, but the range within each district is considerable. For example, the range in Durham is from 2.5 to 4.7 and in Yorkshire from 1.9 to 5.7.

The cleanability of South Wales coals is stated to be very variable and in view of the size of this district and the diversity of its coals and the number of analyses in their hands the Authors did not think they were justified in referring to it.

Part II deals with the economics and cost of coal cleaning.

Calculations, illustrative rather than exact, show that the cost of cleaning may exceed the increase in value to consumers. In two examples given it is assumed that coal of 12,700 B.Th.U./lb. is sold at 35s. 4½d. The value of other coals is assumed to be proportionate to their C.V. A "difficult" coal—*i.e.*, a high-ash (22.75%) coal with a high percentage of middlings—cost 6.7s. per ton to clean down to 4% ash. An "easy" coal with 11.3% ash cost 2.16s. to clean down to 3%. In the former case 21% of the heat units are lost in cleaning, whereas in the latter the loss of heat units is only 6%.

In the Appendixes tables are given which establish a fair degree of accuracy in the figures presented and there is a final note on the definition of the term "inherent ash" for which the Authors suggest "the organic matter in the coal which is derived from the plant material. But that," they say, "would be going too far for the general public, so it would be as well to limit the definition to finely disseminated ash." There is, however, the difficulty that there must be an inherent ash content in each of the fractions. "It would appear quite legitimate to speak of the inherent ash between any specified limits of specific gravity." And they conclude that "it would appear highly desirable that the use of the term, inherent ash, should be confined to floats at 1.35 sp. gr.—that is, to "the ash content of pure coal."

An Appeal to Save Gas was made at a recent meeting of the Forfar Town Council. The Gas Convenor intimated that consumption was going up week after week and he feared that unless there was a saving they would have to cut off gas for a period each day. Coal stocks, he told the meeting, are steadily decreasing. Less than a week ago they were even down to a nine-day supply.

Recent and Impending Developments in Gas Installation Practice*

By R. N. LE FEVRE, A.M.I.Mech.E.,

Training and Education Officer, Gas Light and Coke Company

THIS Paper is, to a certain extent, a revised edition of one I presented to the Institution of Gas Engineers in 1944.† As, however, the Summer Meeting that year was cancelled and, in consequence, the Paper was not discussed, I trust I will be forgiven for repeating some portions which I suggest merit discussion now.

Considerations of the gas installation were, from the outset, recognized by the Government Departments concerned as being an essential contributory part of the general scheme of planning post-war housing.

The part played by the Gas Industry in post-war planning is now in evidence in the Gas Installations Committee's Report and the several Codes of Practice.

The first considerations of all forms of planning for post-war requirements were to review existing and pre-war practice. The fact that a war has upset the daily life of the majority of people in the world and has revealed the need for wide improvements in so many directions does not necessarily mean that everything must be changed and that everything done before September, 1939, was wrong. As far back as 1937 the Institution of Gas Engineers had produced "Regulations governing the installation of Gas Service Pipes, Gas Supply Pipes and Gas Appliances," and the work of the Gas Installations Committee and Codes of Practice drafting panels was simplified by the existence of these Regulations.

In considering the internal installation‡ as far as gas is concerned it is apparent that the practice existing up to the time of the outbreak of war was, generally speaking, of an exceptionally high standard. The reasearch work undertaken by the manufacturers of gas appliances and equipment, coupled with the development of appliances and training of personnel carried out by some of the larger gas undertakings and centres, had been amply justified, as was evidenced by the enhanced prestige which gas service had gained.

There were—and still are—a few exceptions, however. While it is freely admitted that modes of living and climatic conditions vary somewhat throughout the country, the differences are small and chiefly affect the choice of appliances for space heating and, in some places, water heating. As far as actual installation practice is concerned, there appears to be no reason why the best practice should not be a national practice. An internal installation pipe serves the same purpose in any part of the country. Why should it in one place invariably be of steel, in another invariably of copper, and in a third place invariably of "compo"? Is the reason technical or is it merely the outcome of local prejudice?

This and many similar problems confronted the Gas Installations Committee and the several Codes of Practice panels in their search for the truth and having arrived at recommendations for good practice there appears to be no reason why these should not be adopted nationally, and thus ensure safety, long life and economy in maintenance. Limitation of sizes, types and materials to a minimum will assist manufacturers, cheapen costs, facilitate work and shorten the training to be given to operatives. Further, it will provide a valuable contribution to the major post-war problem—to provide houses for the people and to provide them quickly. But they must be good houses, and the part the Gas Industry can play in making them so—in both the initial installation and the subsequent service it offers—is one on which its future will stand or fall.

In the military parlance to which we have all become accustomed in recent years, the objective of operation "gas" is to give first-class service to our consumers. The whole *raison-d'etre* of the Gas Industry is to this end. The research laboratories, the gas-making stations and the distribution network all serve their essential purposes and make their necessary contribution to attaining the objective. But they are the "back room boys," the bases, the lines of communication. When all have played their part, it is left to the front-line troops—the men in actual contact with the public—to make or mar the operation.

Assuming proper control of gas quality and satisfactory distribution the achievement of good gas service depends upon

1. Sound appliance design.
2. The correct selection of the appliance to give the required service.
3. The installation and subsequent maintenance of the appliance which, in turn, involves
   (*a*) Installation equipment: *i.e.* pipes, fittings, &c.
   (*b*) Tools and similar equipment.
   (*c*) Most important of all—skilled men to do the work.

Let us, then, very briefly examine these points in more detail and in the light of recent developments.

Appliance Design

So much authoritative information on this subject has been published elsewhere that it is not intended here to offer more than a few general remarks.

One fact is significant in all recent designs for appliances and that is the very marked trend for simplicity; simplicity not only of general outline but of mechanical construction and operation.

Gone are the days when the more knobs and gadgets we had on our cars and radio sets, the better they were thought to be. The automobile and radio industries have both striven to achieve "one-knob control."

We were tending at one period before the war to load gas appliances with too many complicated ignition devices and similar accessories which all too often required more service than the appliances to which they were fitted. Unless an appliance, such as a cooker, is in considerable intermittent use, the humble match takes a lot of beating as a ready and reliable method of ignition. Another marked trend in appliance design is towards building-in and setting-in. The built-in appliance is one specifically designed to be built into and become part of the fabric of the building. The design is usually such that the appliance cannot be used except in this manner. A familiar example is the built-in panel gas fire. A more recent example is the built-in water heater, several types of which will soon become available.

The inset appliance, on the other hand, is of itself a compact appliance which can be fitted standing free, while being so designed that it may, if required, be set in to fit flush with other appliances similarly constructed, or with other equipment such as kitchen furniture. Such appliances necessitate the imposition of closely limited standardized dimensions.

Some controversy exists over the respective merits of inset and free-standing appliances. The advocates of the free-standing appliance condemn its inset counterpart on the ground of its being impossible to prevent dirt accumulating beneath and behind it. Yet how many of them fit a so-called free-standing appliance with insufficient space all round it to enable it properly to be cleaned? The answer is, then, if the appliance is to be free-standing, let it really be so—with adequate cleaning space around it. If this cannot be so, then it might just as well have no space around it.

Water Heaters

With water heaters the chief developments are a general tidying up of appearance. The valve mechanism and control gear which all too often spoilt an otherwise good-looking appliance have now been concealed in the outer case or the outer case extended to conceal the attendant gear. At least one manufacturer has gone to the extent of building the baffler in to the main shell of the heater. More than ever before the range of types and sizes of domestic gas water heater has been increased, so that there is now a type suitable for any possible domestic requirement.

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* Paper presented to the Southern Association of Gas Engineers and Managers (Eastern District), Nov. 19.

† The Internal Installation in the Post-War Home. Inst. Gas E. Publication, No. 269, 1944.

‡ At the request of the Standards Committee of the Ministry of Works and by common consent of the public utility interests concerned, *i.e.* water, gas, and electricity, it has now been agreed that

The Undertaking's "main" described the main supply in the street.

The "service pipe" is the pipe between the Undertaking's main and the control.

The "control" is the cock, valve, or switch controlling the supply from the undertaking to the consumer.

The "internal installation" is the whole of the installation from the control up to and including the appliances.

The greatest developments are to be seen in gas fires where we have first the appreciable increase in overall thermal efficiency produced by the convector fire.

Improved design in other directions will ensure a longer, more trouble-free life with reduced maintenance service. To this end we have the trend towards luminous flames, and the provision of simple rod-shaped radiants of normally unbreakable material.

Cookers

In the past the designers of cookers—in their endeavour to obtain a pleasing appearance and other sales points—have sometimes overlooked the all-important fact that the first consideration of a cooker is that it *must cook*.

The fundamental considerations of cooker design have been extensively covered by my colleague, Mr. Dunning,* in two complementary Papers on the design of ovens and, more recently, the design of hot plates. Very briefly, the developments in cooker design have been directed towards

1. Cooking quality.
2. Ease of cleaning.
3. Ease of operation—ignition and thermostatic control—but with a marked simplification of design.

Many pre-war cookers *looked* easy to clean but were, in fact, very far from it. The cooker of to-day and the future must not only *look* easy to clean but *be* easy to clean.

With the cooker, more than with any other type of domestic appliance, the frequency of use justifies the provision of automatic ignition. Many methods of automatic ignition have been employed in the past with varying degrees of success. One of the most popular types in the U.S.A. which has not been adopted in this country, is the high-tension electric spark igniter. The objections hitherto raised against this method of ignition were (1) the need for the provision of electric mains, and (2) the potential danger of applying electrical energy at mains pressure direct to the cooker.

It is considered that these objections might now be satisfactorily overcome by the utilization of transformers. The small type of transformer used for bells might be adopted for the dual purpose. This, of course, assumes that the first objection will automatically be overruled by the provision of electricity, for lighting at least, in all new homes.

The preponderance of cookers of the inset type has called for modifications in the conventional arrangements of a rod type thermostat with control knob protruding on the right-hand side of the cooker. It has now become necessary to mount the control-knob centrally and, to avoid gearing, it will be advantageous to depart from the differential expanding rod/tube type of thermostat and adopt the liquid bulb type, which will considerably facilitate better location in the oven. One further important development in this connexion is the inclusion of the oven control tap in the thermostat, thus truly providing one-knob control to the oven.

Selection of Appliances

The responsibility for the choice of appliances for domestic purposes is tending to rest with Government Departments, Local Authorities, and others at a higher level than before. The consumer of the future will occupy his home fully equipped with appliances which have been selected for him in advance.

The importance, then, of being on the spot at the right time competently to advise housing authorities in their choice of appliances must be one of the first considerations of every gas undertaking. In this connexion I cannot let this opportunity pass without paying tribute to my colleagues Messrs. Andrew, Dunning and Holliday† for the valuable work they have done to facilitate the considerations of choice of appliances in post-war houses.

It forms an important aspect of training to ensure that members of the district staff are conversant with the performance of all types of appliances and are fully competent to select the type most suitable to meet any particular requirements of service.

Installation Equipment

(i) *Meter Sizes.* Perhaps in no other connexion in gas installation practice is there to be found such a large variety of sizes, capacities and types as there is with the domestic gas meter. Meter manufacturers have been embarrassed by small orders for obsolete or unorthodox types of meter. But all domestic requirements are satisfied by the three "I.G.E. Gas Meters,"‡ which, allowing for the ordinary type and two sizes (D1 and D2) of prepayment type with optional two-coin mechanism, give a maximum range of five meters. Adherence to the Institution's Specification for Gas Meters for Domestic Consumers, together with a rigid limitation of tolerance in the dimensions between boss centres of prepayment meters, would with great advantage simplify the provision of accommodation for the meter and would result in a limited range of prefabricated connecting pipes becoming available.

(ii) *Meter Connexions.* Great Britain remains one of the few countries to adhere to the use of lead pipe for connecting gas meters. Even in the districts where lead and "compo"* pipe has long ceased to be used for internal pipes, employment of lead still persists for the two short connecting pipes between the meter and the service on one side and the internal installation on the other side.

The Gas Industry of the United States has for many years past prohibited the use of lead pipe for gas, and meters are connected in a simple and rigid manner by a steel or malleable cast-iron bar. Attempts to introduce the meter bar into this country about 10 years ago failed owing to the wide variations in the dimensions between boss centres; consequently, instead of adjusting the bar to suit the meter, the meter was sometimes adjusted to suit the bar!

The bar could, and would, have been a success had the co-operation of the meter makers been sought in asking them to provide meters with standard unions made and positioned by jigs within close limits. The meter bar is now, however, of very limited application. Pre-fabricated connexions and built-in meter compartments have caused its further development to be abandoned.

Service Governors

(iii) *Service Governor.* Where necessary and assuming, of course, the provision of installation pipes of adequate capacity, the service governor should be fitted on the inlet to the meter, thus ensuring registration at the pressure at which gas is normally made.

(iv) *Pressure Point.* The cost of a pressure point is negligible and the inclusion of the point on the outlet of every meter facilitates testing for soundness, obtaining the pressure loss if required, testing for registration at low rates of consumption and the tracing of stoppages should they occur.

(v) *Meter Housing.* "In the past no provision has been made normally in building small houses or flats for accommodating gas meters, with the result that they have frequently had to be installed in unsuitable or inaccessible positions."† It might be argued that the remedy lies in so improving the appearance of the gas meter that it could be fitted unobtrusively and conveniently in any part of a dwelling. This is undoubtedly true. The removal of sharp corners and hard lines would strengthen the case and improve the appearance. This has been done with success by meter manufacturers both in America and on the Continent. The members of the Gas Installations Committee, however, were unanimous in their decision that the first step rests with the planner of the premises, who should accept the responsibility for the design and provision of suitable accommodation for the gas meter. Since it may be confidently anticipated that a considerable majority of post-war homes will be equipped with meters of the prepayment type, it follows that the ruling factor is convenience of access to the consumer. This is best effected by ensuring that the meter cannot be surrounded by household utensils, coal, perambulators, or the usual array of debris, which invariably collects in the cupboard under the stairs in even the best regulated households.

The solution would appear to be the provision by the building authority or owner of a ventilated incombustible compartment of adequate size to house both gas and electricity meters, so that the coin slots are not less than 2 ft. 6 in. or more than 3 ft. 6 in. from floor level, and at what may be termed "pocket height." The prepayment attachment would thus be conveniently accessible to both the consumer and the undertaking's collector. If both meters are housed in the same compartment, a suitable dividing partition should, of course, be provided.

It will be appreciated that the inclusion of the gas meter and controls in a compartment calls for careful choice of methods of connexion and an improved standard of craftsmanship on the part of the gas fitter. But the arrangement lends itself admirably to prefabricated connexions as we have seen already in the temporary houses.

Installation Pipes

The materials most commonly used universally for installation pipes‡ and pipe fittings†† are wrought iron or mild steel pipe with wrought iron, mild steel, or malleable cast-iron pipe fittings, and this practice is followed by the majority of gas undertakings in Great Britain. A few years ago before the outbreak of war the introduction of light-gauge solid-drawn copper pipe with copper or copper-alloy pipe fittings showed many advantages and there is little doubt that, had copper remained in good supply and at low price, it would have been adopted to a large extent for internal installation work.

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* Dunning, E. W. B., and Hayman, R.F. "Domestic Gas Ovens—The Relation of Design to Cooking Quality"; Trans. Junior Gas Associations, 1938.
Dunning, E. W. B. "Domestic Gas Cookers—The Design of the Hotplate"; Trans. Junior Gas Associations, 1946.

† Andrew, L. W., Dunning, E. W. B., and Holliday, G. C., "Technical Aspects of the Gas Industry's Contribution to Post-war Housing," Inst. Gas E. Publication, No. 278/11, 1946.

‡ First and Second Reports of the Meters Committee of the Institution of Gas Engineers, Trans. Inst. Gas Eng., 1935-36, 85, 591.

* Thin-walled lead pipe coated internally and externally with tin to render it impervious to gas. Frequently wrongly supposed to be an alloy or composition of lead and tin.

† Report of the Gas Installations Committee, para. 102, Post-War Building Studies, No. 6, 1944 (H.M. Stationery Office).

‡ The term "installation pipe(s)" means all pipes between the control and the points to which the appliances are to be connected.

†† The term "pipe fitting" means any coupler, connector, union, elbow, bend or tee-piece used in connexion with a pipe.

The popularity of wrought iron and mild steel is due to its cheapness and reliability and in no small measure to the standardization of the method of jointing, the British Standard pipe thread with taper-taper connexion now being recognized by all makers of pipes, pipe fittings, and screw-cutting dies.

Although light-gauge copper pipe for gas and water has been standardized (B.S. 659-1936) its adoption was retarded by the price fluctuations which occurred before the war. It was gaining considerable popularity until the demands and prospect of war made the price prohibitive. There are plentiful supplies of copper throughout the world and if the price of raw copper be controlled there are few, if any, other metals as suitable for internal installation pipes. At present there is a lack of standardization of methods of jointing light-gauge copper pipe.

In the opinion of the Author, the use of what is termed " compo " pipe for the conveyance of gas is strongly to be deprecated.

It would appear that all the advantages claimed for both steel and " compo " are to be had by using copper pipe and it is undoubtedly due to its many advantages that it is used to such a large extent in the aircraft and automobile industries. The methods employed by those industries for prefabricating petrol and hydraulic pipe lines by bending to jigs afford scope for a study by the Gas Industry. No evidence is yet available as to the suitability of rigid thermo-plastic and other plastic pipes for the conveyance of gas, and the Gas Industry is now investigating the properties of these and other synthetic materials.

Flexible Plastics

Considerable progress has, however, been made with flexible plastics as a substitute for rubber. P.V.C.—poly-vinyl chloride—is proving very satisfactory for flexible pipe owing to its flexibility and non-susceptibility to perishing. It is also suitable in thin sheet form for flexible diaphragms for governors and similar devices.

Concealed connexions to gas fires are recommended in all future houses. If a gas fire is not to be installed at the time of building, the supply may still be laid to the back of the floor of the fire opening or, alternatively, a sleeve may be embedded in the concrete to permit the subsequent insertion of the connecting pipe when a gas fire is required. Wherever possible all installation pipes should be concealed up to the point of connexion to the appliances. Careful planning in advance should enable the point to be located to correspond with the gas connexion of the appliance, and ball-jointed unions would give sufficient latitude to correct for small errors in dimensions.

The convenience and popularity of portable appliances has resulted in the availability of a wide range of appliances of this type. The British Standard plug and socket gas connector (B.S. 570-1934) and similar suitable types ensure interchangeability of connexion and enable plug points to be fitted in all suitable locations. Over two million of these connectors are known to be installed and improvements now being made should increase their popularity still further. It is hoped that at least one socket will be fitted in the kitchen of every post-war home, at a height of approximately 2 ft. 6 in. above the floor line, thus facilitating convenient connexion of gas poker, portable heater or gas iron as required.

The gas internal installation requires careful planning at the drawing office stage if the pitfalls of the past are to be avoided and if gas points are to be provided to meet the requirements of a complete gas fuel service. In this connexion considerable guidance is given in the Report of the Gas Installations Committee, B.S.S. 1043-1942, and the Codes of Practice. It cannot be too strongly urged that the installation pipes should be of sizes which will be adequate for any demand they may reasonably be anticipated to meet. The fact, for example, that a gas water-heater is not installed as part of the equipment of a new house should not preclude one being fitted subsequently.

The present trend in pipe work, as it applies to gas fitting and domestic engineering generally, is toward a much higher degree of precision. To this end we are now giving all gas fitter apprentices basic training in general engineering fitting.

Tools

The increasing range of appliances available and the need in so many cases for special tools to adjust them as resulting in the gas fitter's tool kit expanding to unwieldy dimensions.

Considerable effort has been directed towards:

i. Standardizing screws, nuts, unions and similar components of appliances to enable standard tools to be used.
ii. Re-designing tools to increase their range of ability and so reduce their number (*e.g.* combination screwdrivers).
iii. Reducing the weight of tools by the employment of suitable light alloys.
iv. Modifying shape to reduce bulk (*e.g.* flat instead of round oil cans).

Research into tool design has been extensive in other industries owing to war requirements and we have watched this work closely in order to adopt any new tools which will lighten the work of the gas fitter.

Other items of interest include the reduction in the number of tools brought about by the use of copper instead of lead and steel pipe, and the advantage of the portable hydraulic pipe bender over the cumbersome coke forge.

As in the past, the human element enters prominently into considerations of good installation practice, and post-war work is closely linked with the problems of training the personnel which carries out the work. In this connexion it would appear desirable to aim at training an all-round gas appliance mechanic, who would be capable of carrying out the complete gas installation, adjusting all the appliances and effecting their subsequent maintenance service. Such a desideratum is advantageous to the consumer in not having a procession of different men each doing a different job, and to the undertaking in having a highly skilled and completely flexible labour force.

Future Recruitment

It is to be hoped that, in future, recruitment to the fitting staffs of the Gas Industry will be by properly conducted apprenticeship. In this connexion there is need for a national unification of training methods for gas fitter apprentices on the lines of the training scheme of the Shipping Federation, whereby all sea-going apprentices receive similar training irrespective of their company or ship.

In spite of improvement in building construction in gas appliance design and in installation materials and methods, the basic technique of the gas fitter will remain substantially the same. His work will be, as it always has been, the real front line of the Gas Industry's activities. On him, his work, and the way he goes about it depends the whole of the Industry's relations with its consumers.

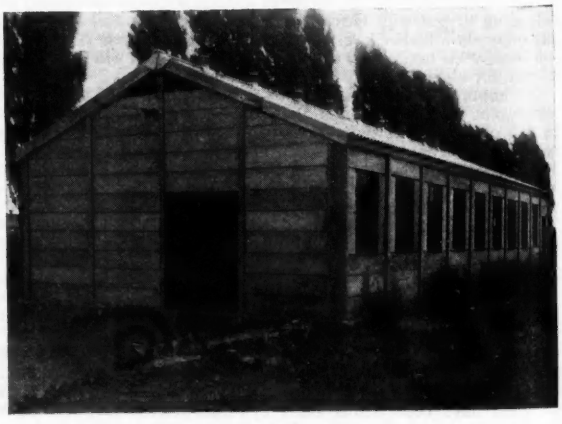
The provision of a common high standard of gas installation practice is a national problem. Good practice in one place will react favourably to gas in many places elsewhere. The well-fitted gas fire in a London hotel is seen and remembered by visitors from all over the country. The craftsmanship and good service given by the local gas fitter in the smallest gas undertaking may influence the opinion of the senior Government official or prominent architect who happens to live in its area of supply.

The Gas Industry has already at its command appliances and equipment of a high order. Much work has been done and is still being done to develop and standardize what is best in both method and material.

There may be some who will say: " This new idea is good but it's impossible to change over to it now. It's too late. Look at the thousands we have in existence. The new will not interchange with the old." But, unless the Gas Industry is to stagnate, the change must come and, once made, experience has shown how soon it is accepted. The vast programme of post-war building affords an opportunity, which may never recur, to break with obsolete and non-standard methods and adopt those now accepted as best.

Watford Training Centre

A District Training Centre has recently been built at Watford by the Watford and St. Albans Gas Company and is now being used to train apprentices and to instruct fitters and all district staff in new developments in installations and modifications, &c., to appliances.



The Watford District Training Centre

A comprehensive selection of cookers, fires and water-heaters have been installed, together with projection apparatus to enable illustrations and drawings to be presented in a clear way. The Centre, a concrete building, is 60 ft. by 25 ft. by 10 ft. high to the eaves, with windows down each side ensuring light, airy conditions. There is accommodation for 24 students, and lectures can be given to classes of 30.

The classes give fitters experience of practical methods of overcoming difficulties which will be met with in the district and will help to raise the already high level of workmanship and service offered to consumers by the Company.

From the Plant Constructor's Angle

A Consideration of the Bulletins of the Fuel Efficiency Committee of the Coking Industry*

By D. T. BARRITT, B.Sc., M.Inst. F.

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WHEN the Authors of this Paper were invited to present jointly a short contribution on Fuel Efficiency they came to the conclusion that a useful purpose might be served if they gave some consideration to the Bulletins of the Fuel Efficiency Committee of the Coking Industry, looked at from the coke oven plant constructor's viewpoint. In the first place it should be recorded that the preparation and circulation of the Bulletins are themselves an indication of the improved co-ordination and efficiency of the Coking Industry. At one time the Coking Industry appeared to the plant constructor as a number of isolated units, with little exchange of ideas and information. The formation of the British Coking Industry Association, with its various technical Committees, and in more recent times the establishment of the British Coke Research Association, have played an important part in securing much closer contact between the technical men in the Industry. The plant constructor by reason of his travels through the Industry is well placed to judge the extent to which this collaboration has progressed and the benefits which have resulted. The Authors greatly value the opportunity they have been given in taking part in the recent efforts towards technical collaboration in the Coking Industry.

In order to appreciate each other's problems it is essential for the plant designer and the plant operator to collaborate, not only when the plant is being designed but during its working life. Experience in the operation of a plant over prolonged periods is of the utmost value to the constructor in the designing of his future installations. Progress depends so often on the improvement of small details. The plant designer therefore welcomes at all times the criticisms and opinions of those who operate the plants he has built. The Authors cordially welcome the formation of Panel 6 of the British Coke Research Association which has been formed to deal specifically with practical plant problems. The work of this Panel is already being reflected in new plants now under construction.

Main Factors in Design

In designing a new coke oven installation the designer's main object is to produce coke, gas, and by-products in the maximum quantity and of the desired quality. In order to achieve this he is faced with balancing various factors, some of which may be conflicting. The four main factors are:—

(*a*) The minimum consumption of fuel gas.
(*b*) A sound and robust structure which will not only sustain a high performance over the working life but which requires the minimum of maintenance.
(*c*) The minimum expenditure of physical effort on the part of the operating personnel and the provision of comfortable working conditions.
(*d*) The lowest capital cost.

It is evident that these factors are inter-related and that their relative significance may alter with change of circumstances. For example, the first two factors are closely related to capital cost. As regards the third factor, a reasonable standard of convenience and comfort can usually be obtained at moderate cost, but over-elaboration can be expensive. Special circumstances may alter the designer's outlook. In the days when coal was cheap and there was little outlet for surplus coke oven gas, there was no need to improve thermal efficiency and spend money on so doing. These circumstances do not and probably never will again apply in this country, but they are still occasionally encountered elsewhere and have to be dealt with. The Authors have knowledge of a large waste heat battery now being built abroad where coal is so cheap that it does not even pay to install waste heat boilers. Or again, in times of trade depression there is a tendency to reduce the capital cost of a new plant to the minimum, with consequent adverse influences on fuel efficiency, maintenance cost and comfort conditions. A further example is the present tendency towards building a large coke oven installation in the form of a number of small batteries to facilitate the rebuilding of the ovens with a minimum disturbance in output. This method of construction has an adverse effect on fuel consumption although achieving its main object.

The position in this country to-day needs no comment. The shortage of coal, its high price, and the demand for coke oven gas make it essential that every new plant shall be designed for maximum thermal efficiency. The need for attracting the right type of operating personnel, able and willing to run the plants to the best advantage, places a duty on the designer to eliminate as far as possible unpleasant work and unnecessary effort. The fact that increased thermal efficiency and to a lesser extent improved working conditions result in greater capital expenditure is unfortunate at a time when construction and material costs are high, but this is a burden which falls on all industrial enterprises with the same ends in view.

General Principles of Oven Design

Improved working conditions are already being studied in detail by Panel 6 of the British Coke Research Association and we do not propose to deal with this large subject in a short review. Better thermal efficiency is however primarily the concern of the designer. How does he set about his work? First of all he must recognize that coking coals vary considerably in their properties and in the treatment they require to produce coke suitable for different uses. He must therefore envisage the coking of a given coal or blend of coals under specified conditions to give the product required. It is not usually possible to regulate a plant to give the best results under conditions widely varying from those for which the plant was originally designed. There are several general principles which he must observe in whatever design he offers. They are:—

1. His heating system must be such that, assuming the coal charged is uniform in all respects, coking is simultaneously completed along the length of the charge. If it is not, some part of the charge will be overheated and fuel gas thereby wasted, while the remainder of the charge is being carbonized.
2. The level of the top of the heating flues must be correctly located to suit the characteristics of the coal charged.
3. The regenerators must be designed and proportioned to work at high efficiency; that is, the heat imparted to the ingoing air (and lean gas in the case of compound ovens) must be as near the theoretical as possible.

Commenting briefly on these factors in order:—

Uniformity of Coking

The taper of the charge demands the correct graduation of temperature from ram side to coke side for simultaneous completion of coking without waste of fuel gas. All oven systems provide means of doing this. With rich gas firing replaceable nozzles are provided for each flue and a good degree of accuracy in distribution is thereby obtainable.

Distribution of air and lean gas supplies in their correct proportions is achieved by balancing the upstream and downstream regenerator sole flues, supplemented in some cases by the use of dampers at the top or bottom of the heating flues.

The correct use of these various devices is a matter of trial and adjustment. Whatever system is available, the right procedure where maximum fuel economy is desired is to use a pyrometer and Orsat apparatus to make adjustments to give not only the desired flue temperature but also a constant and minimum excess air. The labour involved in this work is well worth while. Once the proper cross wall conditions have been established it is rarely necessary to make readjustments.

Level of Top of Heating Flue

The necessity of fixing the top of the heating flue at the correct level is generally agreed. It is sufficient to say here that if the level is too high to suit the particular coal carbonized, the gaseous products will be degraded with formation of roof carbon and the free space above the charge overheated with a wastage of fuel gas. If the level is too low, the lower part of the charge is overheated while waiting for the top to burn off, again with a waste of fuel gas.

The level of the top of the heating flues is determined by the shrinkage of the charge and this can only be obtained with certainty by running several charges of the coal through existing ovens made available by members of the Coking Industry. Once determined and built, the level of the flue top cannot be altered. The coal carbonized, however, may be changed and as charge

* Presented at the "Fuel and the Future" Conference organized by the Fuel Efficiency Committee of the Ministry of Fuel and Power, October, 1946.

shrinkage is related to volatile matter, sizing and water content, the flue level may be incorrect for the new conditions and fuel gas may be wasted.

It is therefore most necessary for the coal supplied for testing to be truly representative of what the plant when built will have to use, also for the plant owner to ensure that such coal is supplied as consistently as possible. If a change in the coal has for unavoidable reasons to be accepted, then it is worth while experimenting with the factors which are under the operators' control to obtain the same shrinkage as the original material.

It is argued that variations in charge shrinkage can be countered by the use of a compensating main to control the temperature of the free space over the charge. This is quite true and all difficulties of overheating this free space can be so avoided in this way. Nevertheless, if the level of the top of the heating flue is too high in relation to the coal being coked, this practice does not prevent the waste of fuel gas.

Regenerators

The correct design of coke oven regenerators is a matter of considerable importance from the point of view of fuel economy. One of the present Authors recently presented a Paper* describing in detail the results of an experimental investigation into the factors governing the design of coke oven regenerators. The work was undertaken because existing knowledge was incomplete or did not relate to the special conditions applicable to coke ovens.

In coke oven practice the working draught is normally furnished by a chimney which provides a limited pull. In addition, as coke oven regenerators are invariably built as an integral part of the oven battery, the pressure differentials must be kept low to avoid leakage through the brickwork. To achieve low pressure differences, gas velocities in the regenerators and flues must be kept low.

In view of the ready availability of processes for cleaning gases and the necessity for the prevention of dust deposition in any part of the oven heating system, the designer assumes the provision of clean fuel gas. Hence, on coke ovens, much narrower channels can be used in their regenerator fillings than in those of other furnaces.

The purpose of the investigation was :—

1. To find the effect and quantitative value as regards heat transfer and pressure loss of the different factors in the design of staggered, straight through, or any other promising types of fillings. This would enable the effect of any variations in design to be calculated and would indicate the most profitable lines of development.
2. Having found the best form of each of a number of different types of regenerator fillings, to compare their relative efficiencies on a practical basis to enable an economic assessment of the designs to be made.

Because of the complicated nature of the problem and the many factors which affect efficiency it was decided to build a full-scale Test Regenerator with all leading dimensions the same as in practice.

The effect on regenerator efficiency and heat transfer of the following factors were studied: Rate of flow or load, size of regenerator, gas velocity, staggering of chequers, channel width, brick thickness, brick properties and length of reversal period. The influence of different designs of filling on pressure losses were also considered.

This is not the occasion to describe the work in detail, but, very briefly, it was shown experimentally that :—

(*a*) The surface area has so much more influence on the heat transfer than either the velocity or the efficiency of sweeping of the surface that in a given regenerator chamber a filling giving a large surface per cubic foot is considerably more efficient than any other arrangement :

(*b*) Staggered chequer bricks showed a small increase in the efficient use of the surface with a change from 4½ in. to 2 in. courses, but the number of bricks is much increased with consequent effect on cost. The velocity can be increased by closer spacing of the chequers, but the pressure loss will set a limit to this. The surface area can be slightly increased by the use of smaller bricks, but lack of stability prevents the use of bricks less than 1½ in. wide.

Practical Outcome of Investigation

The practical outcome of this investigation is that the oven designer can now calculate the quantity of each type of filling required to give a desired regenerator efficiency. With this knowledge and with the current prices of different fillings it is possible to work out the most economical arrangement. A change in the relative prices of the different fillings may alter the choice of filling.

The importance of the size of the regenerator varies according to the type of fuel gas being used. With blast furnace gas firing the bigger volume of waste gas makes it both more worth while and more necessary to provide bigger regenerators than with coke oven gas firing. The following example shows that the effect of reduction of regenerator size is much more marked with blast furnace gas firing, both as regards temperature of waste gas at the stack and percentage loss up the stack. If a battery of coke ovens designed with large regenerators gives a regenerator efficiency of 92%, a stack loss of 15% and a stack temperature of 320°C. on coke oven gas firing, then the same battery would give a regenerator efficiency of 85%, a stack loss of 14.7% and a stack temperature of 250°C. on blast furnace gas firing. On the other hand, if a battery of coke ovens designed with small regenerators gives a regenerator efficiency of 80%, a stack loss of 22% and a stack temperature of 450°C. on coke oven gas firing, then the same battery would give a regenerator efficiency of 67%, a stack loss of 30% and a stack temperature of 470°C. on blast furnace gas firing.

Losses of heat from the waste gases after the reversing valves and air infiltration often result in a low recorded stack temperature which suggests a good efficiency. It is, however, entirely bad as the available draught is reduced and risk of corrosion of the castings and damage to brickwork is increased.

Constancy of Operating Conditions

In the previous section of this contribution the Authors have attempted to set out briefly the principles on which the designer works to provide an efficient plant. They would, however, underline the opinions of the Fuel Efficiency Committee set out in the first Bulletin that in the operation of a coke oven plant a maximum efficiency can only be achieved if working conditions are as nearly uniform as possible. The charging of a coal mixture of uniform coking properties, constant grading and moisture contents has a profound influence on the operating efficiency of a battery as well as on its life. With such a starting point it is possible to adopt a regular pushing schedule. With regular coal quality and a regular pushing schedule it is possible to adjust the flue temperatures at the lowest figure consistent with the desired coke quality. The flue temperatures of a modern large oven cannot be adjusted to meet daily fluctuations in moisture content, bulk density or throughput of coal. Such fluctuations necessitate the temperatures being adjusted to suit the worst conditions, resulting in a waste of fuel gas at other times.

Distribution of Heat

The Fuel Efficiency Committee in their first Bulletin give detailed consideration to the question of heat losses from a coke oven battery.

The heat supplied to the battery is expended in three directions :—

1. In supplying heat for the actual carbonization of the coal.
2. In overcoming radiation and convection losses from the battery surface.
3. In the waste gases passing up the chimney where the heat performs the useful function of providing the necessary draught for the combustion system.

Heat Expended in the Oven

Provided that the ovens are designed in accordance with the principles outlined previously, that the plant is being properly operated and that the coal charge is uniform in its properties, then the quantity of heat used becomes a function of the type of coal carbonized.

Every designer knows that after making allowances for different moisture contents, coals vary in the amount of heat they need to convert them into coke. This makes the comparison of performance between plants of the same design working on different coals a difficult matter. Data on the subject is scanty. It would appear to be a fruitful field of research which the British Coke Research Association should consider.

The effect on the heating efficiency of an oven of the moisture, grading, ash and volatile matter is also very imperfectly understood. The Authors are pleased to see that in the second Fuel Efficiency Bulletin the arbitrary correction of fuel consumption to conditions of dry coal which was given graphically in the first Bulletin has been superseded and that it is now recommended that the correction be made to 8% moisture content, with no correction below this figure. The plant designer will carefully consider the implications of the data and curves given in this second Bulletin. The Authors would, however, suggest that Figure 4, which shows the influence of the moisture content on carbonizing rate, includes so many unknown and variable factors that further investigation seems desirable before the conclusions can be accepted as final. Such factors as wall thickness, "soaking" of the coke and so on would have to be eliminated in "control" tests.

The behaviour of the moisture in the coal during the coking process is not as simple as might be supposed and is a further field of research work which is commended for investigation. Water, as has been frequently demonstrated, is known to drain from coal

* Journal of the Institute of Fuel, February, 1946. T. C. Finlayson and A. Taylor: "An Experimental Determination of the Factors Governing the Design of Regenerators with Special Reference to Coke Ovens."

more easily after charging, but the mechanism by which it does so is not fully understood. Much damage to coke ovens could be avoided if the relationship could be established between particle size and the percentage of water a coal would hold at charging temperatures. It is also probable that the type of coal has a bearing on its draining properties.

Surface Heat Losses

In the first Bulletin the radiation and convection losses are subdivided under the main items of a battery as percentages of the total radiation and convection losses. The sub-division will vary according to the design of plant, but to keep the figures in perspective and to measure the possible influence on fuel consumption of any savings due to modifications in design, it may be of interest to group the losses in terms of B.Th.U. per lb. of coal:—

	B.Th.U./lb. Coal
Losses from Doors and Frames	20
Losses from Oven Steelwork (buckstays, &c.) ...	40
Losses from Battery Top (including castings) ...	57
Losses from Regenator Walls and Castings ...	23
Total	140

These figures show that the most promising field for reducing losses by radiation and convection lies in the direction of better insulation of oven tops and behind the side buckstays. The development of high temperature insulating materials has enabled the plant designer in recent times to reduce the heat losses from both these items. Improvements in these directions should be profitable as well as being conducive to better working conditions.

The Authors are pleased to note that the Fuel Efficiency Committee lays stress on the importance of maintaining a pressure of not less than 3 mm. in the collecting main. They agree that the deleterious effects of air admission to the ovens cannot be too highly emphasized and will give cause to numerous troubles especially in reducing the life of the battery structure. The first Bulletin of the Fuel Efficiency Committee in which the above recommendation was made was dated January, 1944. It is interesting to record that the Interim Report of Panel 6 of the British Coke Research Association on Practical Plant Problems gave statistical data showing the influence of collecting main pressures on damage to buckstays, door frames and jamb brickwork and supported the earlier findings. This is a simple battery control item which should be followed throughout the country with advantage on many counts.

Control Instruments an aid to Fuel Ecomony

The Fuel Efficiency Committee rightly emphasizes the need for the provision of an adequate number of instruments on coke oven plants as a means of securing fuel economy, but it should be stated that the installation of complicated and expensive instruments does not necessarily constitute scientific control of the coking process. Three essentials must be observed.

1. *Range of Instruments Provided.* The Bulletin publishes a list of instruments which the Committee regard as the minimum necessary to give an accurate assessment of plant performance. These, at least, should be provided.

2. *Accuracy of Instruments.* Unless the instruments are accurate their installation is not only a waste of money but they will lead to wrong conclusions. Many large organizations have special departments for instrument maintenance, but the majority have not. In such cases it is a sound plan to arrange with the instrument makers for regular quarterly inspections by a proper instrument engineer. It is an advantage, in such circumstances, to have all the instruments of one make.

3. *Interpretation of Results.* Charts and records are of little value unless their meaning is intelligently interpreted. Scientific control of plant working is impossible unless a competent staff is available to study results and draw proper conclusions from them.

The Authors stress the need for adequate technical supervision on the plant. It is not a costly matter having regard to the value of materials processed and the products made. For example, on a 1,000-ton per day battery the salary of one high-grade technical assistant would be more than covered if his work led to the saving of less than one per cent. of the fuel gas used on the battery.

The same reasoning may be used to show how undesirable it is to give the battery heaters other duties than the regulation of heats.

A coke oven plant cannot be operated at high efficiency for any long period without regular and systematic plant maintenance. It is the experience of the authors that the final responsibility for plant maintenance should lie with those directly interested in the performance of the plant. A high standard of maintenance is more easily achieved if a proper system is adopted of recording the condition of each part of the plant at regular intervals. At one plant known to the Authors a thorough quarterly inspection is made and recorded for the whole plant, including a survey of each oven wall. A chart is provided for each wall, showing every brick. Defects revealed by the inspection are marked on the chart and the steps taken to deal with them. A continuous record of the history of each oven wall is therefore available over a period of years.

In addition, at this plant, units are laid off for inspection, adjustment and cleaning at specific intervals, whether they need it or not. All this may seem a great deal of trouble, but the results justify it. This particular plant, which is of modern design, has passed its sixteenth birthday and is still so good that no term can yet be set to its life.

Production and Distribution of Steam

In the production and efficient use of steam, the Coking Industry lags behind in that it has not taken advantage of modern technique of steam generation or the peculiar possibilities a coke oven plant as a whole offers in making striking reductions in steam consumption.

Few coking plants operate with a boiler pressure of over 140 lb. per sq.in., and while the practice of using exhaust steam for process work is fairly common, the overall steam consumption is rarely less than 400 lb. of steam per ton of coal carbonized, and is often as high as 600 lb. on a complete plant. Provided the plant designer can fix the steam pressure and temperature for a new installation he can reduce the steam requirements to not much more than 200 lb. per ton of coal coked on a complete coke oven plant.

The system in broad outline is as follows:—

1. Steam is generated at the boilers at 350-400 lb. per sq.in. and is supplied only to the exhauster turbines.
2. The exhauster turbines exhaust against a back pressure of, say, 120 lb. per sq.in., which forms the intermediate pressure line for steam supply to pumps, oil heaters, rectification stills, &c.
3. The liquor circulating pumps are turbine driven. They draw steam from the 120 lb. medium pressure line and exhaust into the low pressure main at, say, 25 lb. per sq.in., from which process steam is drawn for ammonia and benzole stills.

It is evident that provided the pressure and temperature of the high pressure steam supply is carefully selected, and the intermediate pressure properly calculated, the whole of the steam requirements of the plant are met by the steam fed to the exhauster turbines.

The steam pressure required at the boilers varies somewhat according to circumstances, but usually does not exceed 375 lb. per sq.in. This pressure is much below what power station practice has been for years.

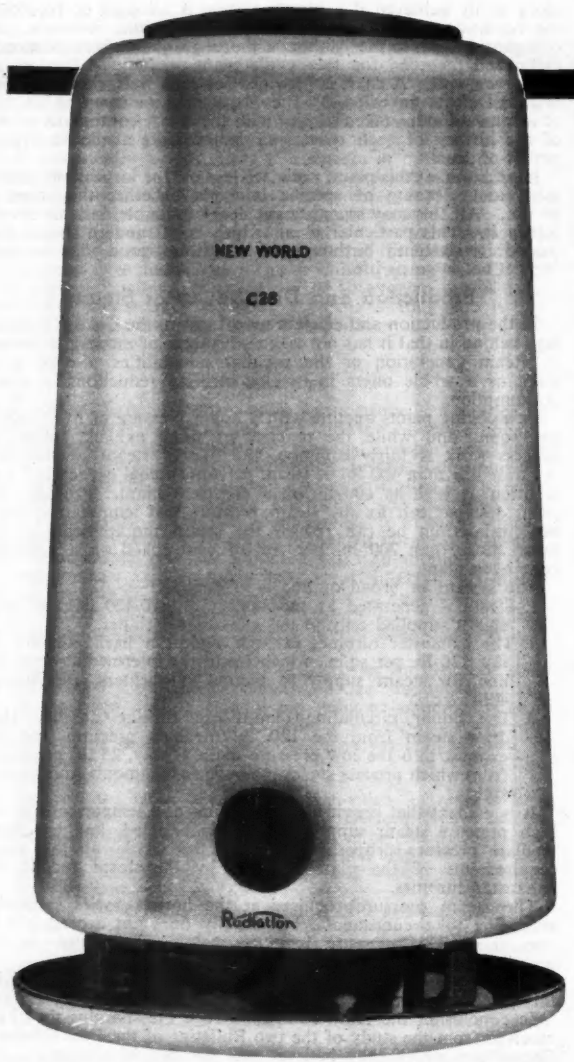
The only opportunity British constructors have had in applying this principle relates to installations built overseas.

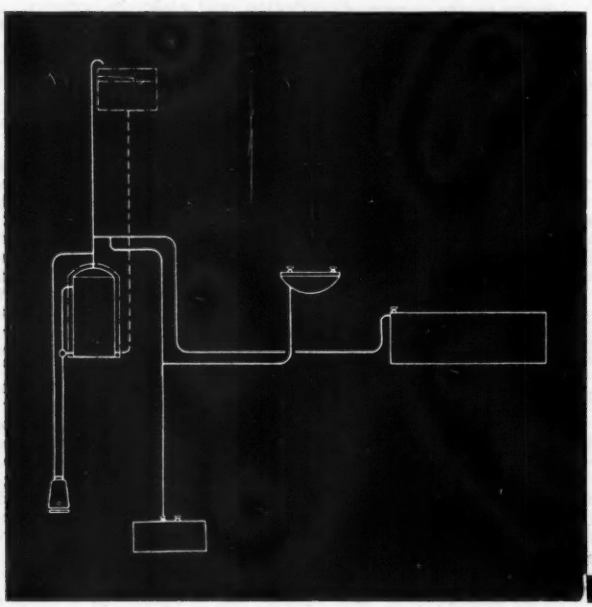
In conclusion the Authors acknowledge the stimulus they have received from the study of the two Bulletins of the Fuel Efficiency Committee, which they believe will be felt by designers and operators alike. They trust that the few additional thoughts set down in the present contribution will assist in achieving the common purpose—namely the attainment of greater fuel economy in the Coking Industry.

Extensions at Limerick

Limerick City Council has decided, subject to the sanction and scrutiny of the Departments of Local Government and Industry and Commerce, to proceed with the erection of a new gas-works with a capacity of two million cu.ft. of gas per day. The development of the works has not kept pace with the normal development of the city during the last 20 years. During that time the number of consumers has doubled, but there has been no increase in the output of gas, due principally to an inadequate distribution system, which has had the effect of restricting the use of gas, particularly at peak periods. There has been a considerable industrial development at Limerick and also an increase in population. More recently the development has been more marked in view of Limerick's proximity to Shannon Airport, which has established a high reputation as an international air junction.

Explaining the new gas-works scheme to the Limerick Chamber of Commerce, Mr. F. K. Thomas, City Gas Engineer, said the present works was in an advanced state of deterioration and only a new works would meet the situation. The proposal was to erect a new works at a cost of £400,000, with plant of the latest design. Space heating and water heating loads were practically undeveloped in the city. He estimated that the manufacturing cost of gas from the new scheme would be less than 1s. per therm, notwithstanding the increased cost of coal. It was estimated that about three times the number of consumers would be obtained if gas were available.





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and effective service. What does the
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Economy: Regulo control. Radiation Economy Valve, circulat
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Effectiveness: Highly efficient, with a hot water output of about
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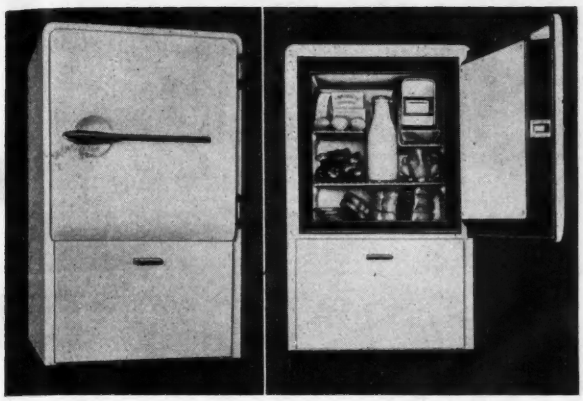
New Model Refrigerator

Electrolux, Ltd., are now going into production with a new model L.150 refrigerator.

It is entirely new in design, with a high class enamel finish and chromium plated and black ornament. The interior, which has storage capacity of 1.6 cu.ft., is porcelain enamelled. It has automatic "Cold Control." There are two removable shelves and one ice tray.



The Electrolux L.150 Gas Operated Refrigerator

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The model L.150 is the "free standing" type of the same design as the well-known M.151 "built-in" model.

The new model L.150 provides ample storage for the normal rations of four people with room to spare. It can be operated by gas, has an overall height of 2 ft. 11½ in., a width of 1 ft. 8⅝ in., and depth of 1 ft. 9⅜ in.

Need for Chemical Engineers

Representatives of gas and kindred organizations to the number of 130 from the Midlands went to Birmingham University on Nov. 4. The visit was part of the plan for securing close co-operation between industry and the University, for which the Midland Gas and Allied Industries University Collaboration Committee is responsible. This body was set up about two years ago at the suggestion of Mr. T. F. E. Rhead (Birmingham) following a visit to the University by the Midland Association of Gas Engineers and Managers.

When the need for a School of Chemical Engineering was put forward at Birmingham University at the beginning of the year the Collaboration Committee expressed interest in the project and sought to assist. Courses in chemical engineering have been held for some years, but the department has only been known by that name for about three months.

A further expansion of the department with a particular bias towards coal utilization and fuel technology is anticipated. This is regarded as an urgent national need as the training of chemical engineers and research in that subject is felt to be vital to the future welfare of the country.

A visit was paid to the laboratory, which it is hoped to expand considerably and which will include a special section concerned with refractories. The proposed expansion will depend to a large extent on the industrial support given to the project.

The Vice-Chancellor of the University (Dr. Raymond Priestley) spoke of the immediate problem of founding a first-class Chemical Engineering Department and said that this country had exhausted, or nearly exhausted the easiest won of the coal, and the highest grade of the iron ores which were its principal original raw material assets in industrial competition.

"We have a small home market," he said, "compared with our greatest competitors and the answers to these problems are to use our remaining resources with the greatest possible economy and ingenuity and to produce for export goods of the highest quality. That is, we must capitalize our best brains, our national skill and the faculty for the co-ordination of hand and brain in which, as a people, we are endowed, I believe, beyond most others, and it is in these two fields that this University plans to help."

Apart from these problems there was, added Dr. Priestley, the fundamental trouble of the nation being to-day one of overtired people. Our industrial system was grievously ill and the chief symptom of the disease was apparently an insufficient output per man hour. He hoped that the University's new department of Engineering Production would help to solve that problem.

Prof. F. H. Garner, Dean of the Faculty of Science, said that in the present year there were probably less than 200 chemical engineering students being trained in this country as against over ten times the number in the United States. Thus the development of chemical engineering should be able to provide assistance in the training of chemical engineers who were a most important factor in future development.

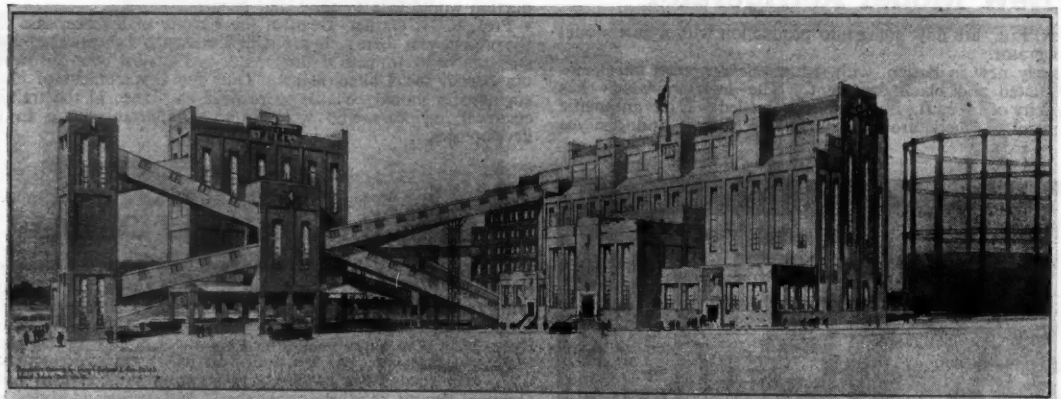
Gas Undertakings' Results

Gas Supply Company (Melbourne).—The accounts for the year ended June 30 show a profit of £17,364, against £15,096 for the previous year. A dividend of 4½% has been declared, leaving £2,056 to be carried forward, against £1,812 brought in. Owing to the shortage of coal, gas was rationed for short periods during the year at several branches, but the total volume of gas sales increased by 4%. Major additions to plant are in progress at Cairns, Mackay, Gympie, Ararat, and Warracknabeal, and minor additions are in progress at other branches.

Glasgow Gas Department.—Gross income for the year ended May 31 amounted to £3,043,050, an increase of £123,363 over the previous year, and gross expenditure was £2,943,032, an increase of £169,386, leaving a revenue balance of £100,018, against £146,042. Interest and sinking fund charges at £143,707 (an increase of £2,587) converted the balance into a deficit of £43,689, but by making use of the surplus brought forward the Department was able to show a net surplus of £799. Gas sales at 11,978,078,893 cu.ft. showed a decrease of 1.2%. Showroom sales were satisfactory, and a reasonable delivery of appliances enabled replacements to be made and housing requirements to be met. During the year 46 demonstrations were held in the show rooms and 16 were held in the district for the various women's organizations. Gas appliances on hire purchase, hire, and free loan at the end of the year totalled 252,998, compared with 254,594 for the preceding year. Coal shortage continued to influence the operations of the chemical department. Owing to the increased production of water gas the receipts of coal tar from the gas-works diminished, and with the constant high demand for gas in place of coal as a domestic fuel it was not possible during the year to extract benzole from the gas produced. Both these factors contributed to a reduction in sales of chemical works products. Another effect of the coal shortage was a continued and increasing direction of products for fuel purposes to the detriment of established road tar business. Pitch for briquette manufacture, creosote-pitch mixture as an alternative to imported fuel oil, and creosote for conversion to petrol had the highest priority and only after satisfying the demands for these was production of road materials possible. Reconstruction of the sulphate of ammonia plant and of the tar acid distillation plant at Provan works is now in progress, and both plants should be in operation before the end of the year.

Workington Gas Department.—Coke oven gas purchased during the year ended Mar. 31 amounted to 373,055,000 cu.ft., an increase of 5.7% over the previous year. The progressive increase in gas sales during the war years continued during the year under review. There was a thermal increase, based on declared calorific value, of 90.81% over 1939, the amount of gas made and/or purchased being 1,865,275 therms, compared with 977,536 therms. Mr. J. G. Pope, Engineer and Manager, in his annual report, says that Department is only on the verge of a rapidly increasing domestic and industrial load, which will ultimately result from the influx of new industries to the West Cumberland Development Area and the possible extension of bulk supplies to other statutory undertakings. Consequently the undertaking faces a period of rapid expansion and heavy expenditure in order to keep in step with the vast demands which will be made upon it. The financial results show a net profit of £1,687, against £1,128 for the previous year. Revenue from industrial consumers showed a decrease occasioned by a gradual reduction in munition production, but domestic consumers again showed a substantial increase. Despite the difficult supply position, the Department supplied 855 new gas appliances during the year. Submitting the report to the Town Council, Alderman S. Walker, Chairman of the Gas Committee, said that for the current year—from April last—there was a further increase of 20% in gas sales above the corresponding period of last year. Indications were that this increase would be sustained. Five extension schemes, including a new 1,000,000 cu.ft. holder and new station meters, had been approved by the Ministry of Fuel and Power. The estimated cost of these works exceeded £10,0000. The provision of these extensions—particularly under present day conditions—would take a considerable period for completion, but he assured gas consumers that the programme in hand would be pursued with energy and vigour.

Meters, Ltd.—An interim dividend on Ordinary stock of 4% actual, less tax, has been declared for the half-year to Sept. 30.



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Company News

Falk, Stadelmann & Co., Ltd.—After providing £52,359 for taxation (against £26,468 for the previous year) the net profit for the year to Mar. 31 was £95,023, compared with £86,187 for 1944-45. To the available balance is added £13,000 reserve for sub-contracts. No final is added to the interim Ordinary dividend of 10% already paid (the same as for the previous year); to contingencies, £10,000 (nil); forward, £53,304 (£47,531). Net current assets are £652,000.

Cannon Iron Foundries, Ltd.—The profits for the year ended June 30 were £125,407, compared with £56,570 for the previous year. Tax deductions, however, increased from £32,639 to £83,496, leaving a net profit of £41,911, against £23,931 for the previous year. After adding £15,000 to general reserve the Directors recommend a final Ordinary dividend of 10%, making 15% for the year as against 10%. A balance of £24,365 is carried forward, against £23,844 brought in.

Publications Received

A leaflet describing Ashworth & Parker enclosed vertical steam engines gives, in addition to a list of the salient points of their apparatus, several illustrations.

A neat booklet, *Small Traders and the Law*, is published by Stevens & Sons, Ltd., and written by H. Ison Porter. The book, the price of which is 4s. 6d., has chapters dealing with such subjects as purchase of premises, mortgages, compensation, trading contracts, responsibilities, &c.

The Company and You is the title of an attractive booklet designed for presentation to apprentices joining the Gas Light and Coke Company. It describes in everyday language the organization and benefits of the Company and contains a folding plate showing pictorially the manufacture of gas.

Of the greatest interest to employers is a volume published by Butterworth & Co. (Publishers), Ltd., dealing with *The National Insurance (Industrial Injuries) Act*, 1946. In a lengthy introduction, the history and the full import of this Act are discussed in detail and the book is completed by a comprehensive index. The net price is 15s.

Ni-Hard Versus Abrasion is the title of a booklet recently issued by the Mond Nickel Co., Ltd., dealing with the properties and applications of a specially hard alloy cast iron. Abrasive wear is one of the problems encountered in engineering practice. The wear of moving parts leads to loss of precision with loss of efficiency in machinery, plant and equipment of all kinds. The replacement of worn parts in turn involves loss of time and money and may also entail costly and inconvenient stoppages in industrial processes. In many industries where grinding operations are included in the processes or where abrasive substances such as minerals, clays, coal, ash, and sand must be handled, the conditions in the plant are intensely abrasive. Ni-Hard is a white or chilled cast iron which has been developed especially to withstand this type of service. For the information of those who design, build, or maintain such plants, this publication deals with both the metallurgical aspects of Ni-Hard and some practical applications in industries where Ni-Hard has been extensively adopted.

GAS PRODUCTS PRICES

The London Market

November 22.

There are no changes to report in the prices of the main Coal Tar products in the home market, to-day's values being as under:—

Pitch for briquetting 75s. per ton ex makers' works.

Road Tar 5½d. per gall. filled into buyer's road or rail tanks and 5⅞d. filled into buyer's barrels. All at sellers' works.

Creosote for timber preservation costs 5½d. per gall. in minimum 800 gall. lots in bulk ex sellers' works.

Home demands continue strong, with exports on a restricted scale.

The Provinces

November 26.

Average prices of gas-works products: Pitch, 75s. per ton; toluole, naked, North, 90's, 2s. 4d. to 2s. 6⅜d. per gallon; pure, 3s. 2¼d. Prices for carbolic acid 60's, anthracene, creosote oil (hydrogenation), coal tar oils (timber preservation, &c.), and strained anthracene oil are controlled by Government Ord.rs. Prices for road tar were increased by a half-penny per gallon by S. R. & O. 1945, 229, under which Order there was a'so an increase of 5s. per ton in the price for standard creosote-pitch mixture.

Scotland

November 23.

Demand continues in excess of supply.

*Refined Tar.** Yield to the Distiller is 5d. per gall. ex works, naked. *Creosote Oil.* Timber preserving quality,* 5½d. to 6½d. per gall.; Hydrogenation Oil,* 5⅞d. per gall.; Low Gravity or Virgin Oil,† 7⅛d. to 7½d. per gall. ; Benzol Absorbing Oil, 6½d. to 8d. per gall. *Refined Cresylic Acid** is 3s. 6d. to 4s. 6d. per gall. ex works, naked, according to quality. *Crude Naphtha,*† 7d. to 8d. per gall. *Solvent Naphtha.** Basic maximum prices delivered in bulk, 90/160 grade, 2s. 10d. per gall. and 90/190 Heavy Naphtha, Unrectified, 2s. 0½d. per gall.; Rectified, 2s. 4d. per gall. *Pyridine,*† 90/160 grade, 15s. per gall., and 90/140 grade. 17s. per gall.

* Price controlled. † Uncontrolled.

Stocks and Shares

The past week saw another hectic search for yields and the number of markings at 63,067 was nearly 13,000 higher than the previous week. The industrial market was the most prominent on the reinvestment from holders of home railway stocks.

There was also greater activity among gas stocks and shares and although the market was not without a few small reactions the bulk of the price changes were again in an upward direction. A feature was the sharp rise of 8 points in Oriental stock to 250. The following is the full list of movements up to Thursday last:—

OFFICIAL LIST

Assocd. Gas & Water ord.		20/ — 22/	+ 1/	
Do. deferred		20/ — 22/	...	
Bombay	xd	47/ — 49/	Nov. 18	
Colombo Gas & Water 7 p.c. pref.	xd	23/6— 25/6	Nov. 18	
Gas Consolidation "A" ord.	xd	20/ — 22/	Nov. 18	
Do. "B" ord.	xd	19/ — 21/	Nov. 18	
Do. 4 p.c. red. cum. pref.	xd	18/6— 20/6	Nov. 18	
Imperial Continental ord.		110 —115	— 1	
Oriental		245 —255	+ 8	
Primitiva Holdings Ltd.		10/ — 12/	— 6d.	
South Metropolitan ord.		96 — 99	— 1	
South Suburban ord.		107 —112	+ 2	
Do. 3¾ p.c. red. pref.		100 —105	+ 1	
Tottenham ord.		107 —112	+ 2	
United Kingdom 4½ p.c. 1st cum. pref.	xd	23/6— 24/6	Nov. 18	
Do. 4 p.c. 1st red. cum. pref.	xd	20/6— 21/6	Nov. 18	
Wandsworth 4 p.c. pref.		104½—107½	+ ½	

SUPPLEMENTARY LIST

Eastbourne "B"	98 —103	+ 3	

PROVINCIAL EXCHANGES.

Bath cons.	115 —117	+ 1	
Bristol 5 p.c. max.	118 —119	+ 1	
Liverpool 4 p.c. red. deb.	103 —105	+ 2	
Newcastle units	25/3— 25/9	+4½d.	
Sheffield cons.	137 —140	+ 1½	

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